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Bulletin 104

THE FORAMINIFERA OF THE ATLANTIC OCEAN

PART I. ASTRORHIZIDAE

BY

JOSEPH AUGUSTINE CUSHMAN

Of the Boston Society of Natural History

WASHINGTON
GOVERNMENT PRINTING OFFICE
1918

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RICHARD RATHBUN,
Assistant Secretary, Smithsonian Institution,
In charge of the United States National Musuem.

WASHINGTON, D. C., June 10, 1918.

General
Gift
Museum

INTRODUCTION.

This paper is the first part of a work the intent of which is to describe and illustrate the Foraminifera of the Atlantic Ocean, especially those species which have occurred in the waters adjacent to the shores of the United States, including the whole of the Gulf of Mexico and the Caribbean Sea, that being the area in which most of the work of the vessels of the United States engaged in dredging work has been done. This part includes only the family Astrorhizidae, which is the most primitive of any of the group.

The various vessels of the United States Bureau of Fisheries, including the *Bache*, *Bluelight*, *Speedwell*, *Fish Hawk*, and especially the *Albatross*, have accumulated a mass of dredged material consisting of thousands of samples which fairly well represent the bottom of the area mentioned. Besides, there are available a great many of the samples of bottom obtained by the United States Coast and Geodetic Survey. Other collections have also been used as will be mentioned later.

Except for the work of Dr. James M. Flint, published in 1899, there is almost nothing published which deals in any considerable amount with the foraminifera of this region. The region of the North Sea and the waters about the British Isles have been the source of a great mass of published records and a comparison with that area is very interesting.

I wish here to express my deep appreciation of the many kindnesses and abundant help which the United States National Museum and its staff have so unstintingly given me in the study of this material and in the preparation of this work.

Joseph Augustine Cushman.

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THE FORAMINIFERA OF THE ATLANTIC OCEAN.

ASTRORHIZIDAE.

By Joseph Augustine Cushman,
Of the Boston Society of Natural History.

GENERAL ACCOUNT.

In a previous work on the Foraminifera of the North Pacific Ocean[1] the writer has given a general account of the Foraminifera. For a more lengthy and detailed account the reader is referred to Chapman's volume on the Foraminifera, 1902.

From the fact that much of the work on Recent Foraminifera has been done by English and French workers the area about the British Isles and the immediate coast of Europe is better known than any other region. As a result the known foraminiferal fauna of the eastern North Atlantic is very considerable. The work of Sars, Goës, Williamson, Parker, Jones, H. B. Brady, Robertson, Siddall, Chaster, Wright, Sidebottom, Heron-Allen, Earland, Pearcey, D'Orbigny, Schlumberger, de Folin, Schaudinn, Rhumbler, and many others has made a formidable mass of literature on the recent foraminifera of this region. From the western Atlantic Bailey, Goës, and Flint especially have given us many records from the American coast including the West Indies.

From the deeper regions the *Challenger* expedition with those of the *Porcupine*, *Knight Errant*, *Goldseeker*, *Albatross*, and many other expeditions have added greatly to the mass of records from this ocean basin.

The Atlantic being shallower than the North Pacific has much greater deposits of globigerina ooze with comparatively small areas of red clay. The great development of shallow water continental shelf areas on the Atlantic coasts of Europe and America makes prolific areas for many species, while the coral reefs of the warmer regions of the West Indies give a great development of the characteristic species of such warm waters.

That there are very well developed areas of distribution is shown by the records of the species of this single family. As a rule, the

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[1] Bulletin 71, U. S. Nat. Mus., 1910–1917.

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JOSEPH AUGUSTINE CUSHMAN.

constituents are inconspicuous as in *Ammodiscus*. This cement gives the characteristic color to many of the species of the family.

Siliceous.—In a few species there seems to be a siliceous cement, as it is unaffected by acids. Many species either secrete or collect fine amorphous siliceous material which is used in the building of the test wall.

SELECTIVE POWER IN THE FORMATION OF THE TEST.

No apparent selection.—A number of species, including those of the genus *Astrorhiza*, simply consolidate more or less firmly the material of the ocean bottom, mud, sand grains, other foraminifera, sponge spicules, etc., indiscriminately into more or less regular tests, the outside usually friable, the inner portion commonly firmer. In such tests as these there seems to be no attempt at any selection, the purpose seeming to be to form a somewhat hard protection to the protoplasmic body.

General selection.—Various groups of the arenaceous foraminifera have some power of selection in that they take some general constituent of the bottom. For instance, *Rhabdammina* usually in its various species uses sand grains or occasionally spicules. This seems to be mainly a case of leaving out one element at the expense of another. Fragments of the harder materials are taken instead of the softer mud or, as in the case of *Crithionina*, taking the finer material and discarding the coarser. As there is no particular power shown in the fitting of these particular groups of material in any definite way except in the matter of the smoothness of finish of the exterior or interior surfaces, the selection can not compare with that which is found in the next group.

Specific selection.—In a few cases the various species seem to have a great power of selection of the material of the test and in the arrangement of the particles which have been selected. The genus *Psammosphaera*, building a generally rounded or irregular test with a single cavity and no definite aperture, has in the various North Atlantic species a great power of specific selection and arrangement.

The common *P. fusca* uses only sand grains, cementing them firmly together, often with a lighter colored cement. Off the coast of the Carolinas specimens are abundant which have taken only black grains, although other colored ones are present as well in the bottom material. The size is not definite and often in smaller specimens the whole of one side will be formed by a single large grain.

P. parva has a habit of building a test of sand grains of much more even size and usually adds to the test a single large acerose sponge spicule which is built into the wall and projects on either side often to a distance as great as the diameter of the test itself. That this is entirely accidental can not be held, for the specimens without the spicules are few and I have never seen one with a short or broken spicule, but always with a very long uninjured one.

P. testacea builds its test of other foraminifera and lives especially as would be expected in globigerina ooze. The tests are not alike nor of the same size nor shape, but sand grains are almost never used, while in the same dredge haul may be other genera and species largely made up of sand grains.

In *P. bowmanni* there is a selection by which only mica flakes are used, these being cemented together by their edges, making a weak and irregular test. Such specimens, however, rarely show any sand grains and the selective power must be considerable, for in most bottom material the amount of mica flakes is not great.

Lastly, in *P. rustica* is a species with an even greater ingenuity. It uses large acerose spicules for the main lines of its polygonal test, then fills in the sides with broken spicules, fitting each to the polygonal area between the three or more borders of that surface. The long edge spicules are the only ones that extend beyond the face of the wall, the others being fitted as though cut off at the various lengths. The only explanation of the building of such a test as this is that the material is ingested in the protoplasm and then at a certain stage carried to the outside of the protoplasmic body to form the test, and that the distribution of the inner broken spicules is mechanically arranged and the whole cemented.

In the genus *Technitella* there is also a marked selection. *T. melo*, for example, has a rounded test built entirely of sponge spicules, these placed lengthwise of the test and firmly cemented. In *T. legumen*, which is sometimes found with the former species, fine amorphous white material is also used with the spicules and two layers of spicules are distinguished, the inner running transversely and the outer lengthwise. As a result a strong test is developed when the amount of spicules is considerable. In *T. thompsoni* there is a very unique condition in which the test is made up of the disintegrated plates of a brittle star. The amount of these plates in any given area can not be very great, yet the animal obtains sufficient numbers of them to build its test from these entirely, using probably hundreds of individual plates in the process.

SYSTEMATIC TREATMENT.

Order FORAMINIFERA.

Pseudopodia of fine threads, freely anastomosing to form a network; test typically with many minute foramina, in one family with a single aperture; wall of the test composed of chitinous or calcareous material when secreted, or of agglutinated sand, sponge spicules, shells, etc., usually secreting either no silica or a very little under certain conditions.

Family 1. GROMIDAE.

Test usually chitinous, sometimes with a covering of foreign material; apertures one or more; as a rule inhabiting fresh or brackish waters.

As most of the material of this paper is based upon dredged material and has been examined dry little opportunity has been had for obtaining material of this family. Papers by Rhumbler[1] and Calkins[2] may be referred to as having Atlantic data for this family.

Family 2. ASTRORHIZIDAE.

Test composed of agglutinated material for the most part, occasionally with a chitinous inner layer, consisting of a chamber with several openings or a tubular test open at both ends, or in certain forms, of a closed chamber with a single aperture, but throughout the family the test is not divided into a series of chambers.

The species included in this family build tests of agglutinated material, often placed outside a chitinous base as in *Rhizammina*, *Pelosina*, etc. The simplest species, such as found in the genus *Astrorhiza*, simply gather about the soft parts the mud or débris from the bottom and agglutinate it somewhat with a small amount of cement, the central chamber corresponding to the main part of the cell and the arms to the pseudopodia. Next in order are tests with definite openings and later a test closed at but one point, which serves as the aperture, such as *Pelosina*, *Pilulina*, etc., or with several apertures, *Thurammina*. From this the series leads to the species having a definite globular proloculum or initial chamber and a second chamber of greater or less length, *Hyperammina*, *Ammodiscus*, etc.

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[1] Arch. Prot., vol. 3, 1903, pp. 181-294.

[2] Marine Protozoa from Woods Hole, Bull. U. S. Fish. Comm., vol. 21, 1900 (1902), pp. 415-468.

Subfamily 1. ASTRORHIZINAE.

Test consisting usually of a tube open at both ends or in some species of *Astrorhiza* with several tubes entering a central chamber; in some species with the tube branching (*Rhabdammina irregularis*, *Rhizammina algaeformis*, etc.).

Included in this subfamily are five genera, *Astrorhiza*, *Rhabdammina*, *Marsipella*, *Bathysiphon*, and *Rhizammina*. With the exception of the first, we know very little concerning the animal, excepting for the material of which the test is made; each consists of a simple or branching tube open at the ends, except in some species of *Astrorhiza*, where there are several tubes and a single central chamber. The growth seems to take place by the addition of material at the open ends of the tube, thus increasing the length. The openings are often variously protected by an accumulation of foreign particles, sponge spicules, etc.

Genus ASTRORHIZA Sandahl, 1857.

Astrorhiza SANDAHL (type, *Astrorhiza limicola* Sandahl), Öfv. Svensk. Vet. Akad. Förh., vol. 14, No. 7, 1857, p. 299.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 230.—FLINT, Ann. Rep. U. S. Nat. Mus., 1897 (1899), p. 265.—RHUMBLER, Arch. Prot., vol. 3, 1903, p. 216.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 19.

Astrorhiza+*Rhabdammina* (part) EIMER and FICKERT, Zeitschr. wiss. Zool., vol. 65, 1899, p. 666.

Ammodiscus CARPENTER and JEFFREYS, Proc. Roy. Soc. London, 1870, p. 159 (not *Ammodiscus* Reuss, 1871).

Arenistella FISCHER and DE FOLIN, Les Fonds de la Mer, vol. 2, 1872, p. 26.

Astrodiscus F. E. SCHULZE, II Jahr. Comm. wis. Unt. deutsch. Meer in Kiel, vol. 1, 1875, p. 113.

Haeckelina BESSELS, Jen. Zeitschr., vol. 9, 1875, p. 265.

Description.—Test free, flattened or tubular, stellate or subcylindrical, composed of a central chamber with communicating tubular portions to the exterior in the compressed species or of an irregular tubular chamber in the subcylindrical ones; wall composed of sand or mud loosely cemented, often with an inner lining of chitinous material.

Most of the species appear to be characteristic of cool-water conditions, although *A. vermiformis* is a species apparently as far as is known limited to the Gulf of Mexico.

ASTRORHIZA LIMICOLA Sandahl.

Plate 1, figs. 1, 2.

Astrorhiza limicola SANDAHL, Ofvers Kongl. Vetenskaps-Akad. Förhandl., vol. 14, 1857, p. 299, pl. 3, figs. 5, 6.—LEIDY, Proc. Acad. Nat. Sci. Philadelphia, 1875, p. 65, fig. —P. FISHER, Journ. Zool., vol. 4, 1875, p. 505, pl. 16, figs. 1–4.—NORMAN, Proc. Roy. Soc. London, vol. 25, 1876, p. 213.—H. B. BRADY, Quart. Journ. Micr. Sci., vol. 19, 1879, p. 43.—BÜTSCHLI, in Bronn, Klassen und Ordnungen Thier-Reichs, 1880, p. 194, pl. 5, fig. 11.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 231, pl. 19, figs. 1–4.—A. AGASSIZ, Bull. Mus. Comp. Zoöl., vol. 15, 1888, p. 161, fig. 489.—WOODWARD, The Observer, vol. 4, 1893, p. 78.—GOËS, Kongl. Svensk. Vet. Akad. Handl., vol. 25, No. 9, 1894, p. 12, pl. 1, figs. 1–3.—RHUMBLER, Zeitschr. Allgem. Physiol., vol. 2, 1902, p. 204, fig. 46; Arch. Prot., vol. 3, 1903, p. 217, fig. 36 (in text).—CUSHMAN, Proc. Boston Soc. Nat. Hist., vol. 34, 1908, p. 22.—HERON-ALLEN and EARLAND, Journ. Quekett Micr. Club, ser. 2, vol. 10, 1909, p. 407, pl. 33, fig. 1.—CUSHMAN, in Sumner, Osburn, and Cole, Bull. Bureau U. S. Fisheries, vol. 31, pt. 2, 1911, p. 549.—HERON-ALLEN and EARLAND, Trans. Zool. Soc. London, vol. 20, 1915, p. 607.

Arenistella elegans (*nomen nudum*) FISHER and DEFOLIN, Les Fonds de la Mer, vol. 2, 1870, p. 26; 1872, vol. 2, p. 52.

Ammodiscus lindahli CARPENTER and JEFFREYS, Proc. Roy. Soc. London, 1870, p. 159.

Astrodiscus arenaceus F. E. SCHULZE, in Jahresb. Komm. wiss. Untersuch. Deutsch Meere, vol. 1, 1875, p. 113, pl. 2, fig. 10.

Haeckelina gigantea BESSELS, Jenaische Zeitsch. für nat., vol. 9, 1875, p. 265.

Description.—Test free, compressed, irregularly stellate; composed of a central disk from which horizontal arms radiate horizontally around the peripheral region, variable in length and of irregular form, usually long and slender, often irregularly bifurcating at the tips, 5–15 in number; wall thick, composed of mud with fine sand grains, or in some cases entirely of rather coarse sand grains, interior with a chininous lining, smooth, exteriorly roughened; ends of the arms serving as apertures; wall grayish or yellowish, interior yellowish brown.

Diameter, including arms, up to 15 mm.

Distribution.—From the available records this is a species of shallow waters and for the most part of temperate to cool regions. The following are the Atlantic records: Coast of Bohuslan, Skager-Rack, Sweden (Sandahl, Loven); coast of Norway (Norman); off Heligoland, 21 fathoms (Schulze); off Dunbar (Balfour); west coast of Scotland, 10–20 fathoms (Robertson, Herdman); Northumberland and Durham (Brady); Torbay, Devon (Norman); coast of Connecticut, 25 fathoms, and Maine (Bessels, Verrill); off Block Island; south of Newport and south of Marthas Vineyard (Verrill); Anticosti and Gaspé Peninsula (Woodward); Vineyard Sound, 13 fathoms (Cushman), and off Cape Ann.

Heron-Allen and Earland record a single specimen from the Kerimba Archipelago off the eastern coast of Africa.

From the specimens I have been able to study, the material of the test depends very greatly upon the character of the bottom. The specimens from Gaspé and from the sandy portion of Vineyard Sound have the tests made of coarse quartz sand very largely, and very little mud or fine material is used in their construction.

Astrorhiza limicola—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
.....	B.S.N.H.	10+	....	Off Cape Ann, Mass.	....	....	....	....
.....	B.S.N.H.	3	....	Vineyard Sound, Mass.	....	....	....	Common.
.....	U.S.N.M.	10+	U.S.F.C. sta. 967 (1881).	Off Marthas Vineyard, Mass.	....	....	....	....

ASTRORHIZA ARENARIA Norman.

Plate 2, figs. 1–3; plate 3, fig. 1.

Astrorhiza arenaria Norman, Proc. Roy, Soc. London, vol. 25, 1876, p. 213.—H. B. Brady, Quart. Journ. Micr. Sci., vol. 29, 1879, p. 43.—Bütschli, in Bronn, Klassen und Ordungen, Thier-Reichs, 1880, p. 194, pl. 5, fig. 12.—H. B. Brady, Proc. Roy. Soc. Edinburgh, vol. 11, 1882, p. 711; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 232, pl. 19, figs. 5–10.—Goës, Kongl. Svensk. Vet.-Akad. Handlingar, vol. 25, No. 9, 1894, p. 12, pl. 2, figs. 4–10.—Flint, Ann. Rep. U. S. Nat. Mus., 1897 (1899), p. 265, pl. 3, fig. 2.—Rhumbler, Arch. Prot., vol. 3, 1903, p. 217, fig. 37 (in text).—Kiaer, in Duc d'Orleans, Croisière Océanographique dans la Mer du Gronland, 1905 (1907), p. 559.—Heron-Allen and Earland, Journ. Quekett Micr. Club, ser. 2, vol. 10, 1909, p. 407, pl. 33, fig. 2.—Pearcey, Trans. Roy. Soc. Edinburgh, vol. 49, 1914, p. 997.

Astrorhiza limicola M. Sars (*nomen nudum*) (not *A. limicola* Lindahl), Forh. Vid. Selsk. Christiania, 1868, p. 248.—Carpenter, Proc. Roy. Soc. London, vol. 17, 1868, p. 173.—G. O. Sars, Forh. Vid. Selsk. Christiania, 1871 (1872), p. 252.

Astrorhiza, sp., Carpenter, Quart. Journ. Micr. Sci., vol. 16, 1876, p. 221, pl. 19.

Description.—Test compressed, typically with a subcircular mass from which radiate short, stout arms, variable in number, or sometimes elongate with short lateral branches; radiate forms with a rounded central chamber from which the tubular arms are given off; wall thick composed of loosely agglutinated grayish sand, outer surface friable and rough, inner surface smoother and firmer; apertures at the ends of the tubular extensions of the central chamber, usually more or less choked with fine sand grains.

Diameter, up to 15 mm.

Distribution.—Specimens on the European side of the Atlantic are known from the coasts of Norway and Sweden, off Spitzbergen, North Sea and Faroe Channel. On the American side of the Atlantic it is known from Davis Strait, and from three *Albatross* stations given by Flint in the general region off Cape Cod. In the abundant *Albatross* material I have examined, the species has occurred at numerous stations but all in the general region from Nova Scotia southward to Cape Hatteras. These stations range in depth from 82 to 1,631 fathoms, the average being somewhat less than 1,000 fathoms. Bottom temperatures range from 37.3° to 40.6° F. South of this it has not occurred in the material dredged.

Brady records it from off the Cape of Good Hope and Pearcey from two deep water stations in the Antarctic.

Astrorhiza arenaria—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.[1]	Abundance.
			Albatross.	° ′ ″ ° ′ ″		° *F.*		
9575	U.S.N.M.	6	D2406....	40 02 49 N.; 68 49 00 W.	407	40	b. m........	Common.
9576	U.S.N.M.	10	D2172....	38 01 15 N.; 73 44 00 W.	565	39	gn. m........	Few.
9578	U.S.N.M.	10+	D2187....	39 49 30 N.; 71 10 00 W.	420	39.7	gn. m. s......	Few.
9577	U.S.N.M.	2	D2189....	39 49 30 N.; 70 26 00 W.	600	39.7	gn. m. s......	Few.
9580	U.S.N.M.	4	D2203....	39 34 15 N.; 71 41 15 W.	705	38.9	gn. m. s......	Few.
9579	U.S.N.M.	10+	D2202....	39 38 00 N.; 71 39 45 W.	515	39.1	gn. m........	Few.
9581	U.S.N.M.	10+	D2213....	39 58 30 N.; 70 30 00 W.	384	39.5	gn. m........	Common.
9229	U.S.N.M.	1	D2214....	39 57 00 N.; 70 32 00 W.	475	39.5	gn. m........	Few.
9230	U.S.N.M.	1	D2234....	39 09 00 N.; 72 03 15 W.	810	38.6	gn. m........	Common.
9231	U.S.N.M.	2	D2237....	39 12 17 N.; 72 09 30 W.	520	39.5	gn. m........	Few.
9582	U.S.N.M.	5	D2263....	37 08 00 N.; 74 33 00 W.	430	....	gn. m........	Few.
9232	U.S.N.M.	1	D2504....	44 23 00 N.; 61 22 45 W.	82	40.6	bk. m. g......	Rare.
9233	U.S.N.M.	10+	D2547....	39 54 30 N.; 70 20 00 W.	390	39.6	gn. m........	Abundant.
9234	U.S.N.M.	1	D2564....	39 22 00 N.; 71 23 30 W.	1,390	37.3	gy. oz........	Rare.
9235	U.S.N.M.	10+	D2571....	40 09 30 N.; 67 09 00 W.	1,356	37.8	gy. glob. oz...	Rare.
9236	U.S.N.M.	1	D2716....	38 29 30 N.; 70 57 00 W.	1,631	....	br. oz. for....	Rare.
9238	U.S.N.M.	10	D2729....	36 36 00 N.; 74 32 00 W.	679	....	dk. gn. m....	Rare.
9237	U.S.N.M.	10+	D2731....	36 45 00 N.; 74 28 00 W.	781	....	gy. oz........	Rare.
6245	U.S.N.M.	3	Lightning	....	530	47	....	

[1] "Character of bottom," determined by the specimens from the sounding cup, is expressed by abbreviations, the key to which is appended. It will be noted that these abbreviations are arbitrarily capitalized for nouns. When used as adjectives, however, the noun abbreviations are not capitalized.

bk.........	black	Glob.......	Globigerina	R...........	Rock
bl..........	blue	gn..........	green	Rf..........	Reef
br..........	brown	gn-br.......	greenish-brown	rky..........	rocky
br-gn.......	brownish-green	gn-gy.......	greenish-gray	S...........	Sand
brk.........	broken	gy..........	gray	sctrd.......	scattered
C...........	Clay	hrd.........	hard	Sh..........	Shells
Clmps......	Clumps	Lav........	Lava	sml.........	small
Co..........	Coral	M..........	Mud	Sp..........	Specks
crs..........	coarse	mrgn.......	marginal	St..........	Stones
dk.........	dark	Mss.........	Masses	vol.........	volcanic
fne.........	fine	Oz..........	ooze	W..........	Seaweed
For........	Foraminifera	P...........	Pebbles	wh.........	white
G...........	Gravel	Ptr.........	Pteropod		

ASTRORHIZA ANGULOSA H. B. Brady.

Plate 3, fig. 2; plate 4, figs. 1–3.

Astrorhiza angulosa H. B. Brady, Quart. Journ. Micr. Sci., vol.. 21, 1881, p. 48; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 234, pl. 20, figs. 10–13.—Goës, Bull. Mus. Comp. Zoöl., vol. 29, 1896, p. 19.—Flint, Rep. U. S. Nat. Mus., 1897 (1899), p. 265, pl. 3, fig. 1.—Rhumbler, Arch. Prot., vol. 3, 1903, p. 218, fig. 38 (in text).—Cushman, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 20, fig. 1 (in text).

Description.—Test somewhat compressed, subtriangular or rarely quadrangular, biconvex, broadly rounded at the edges, angles of the test formed by the open ends of tubular portions radiating from a small globular central chamber; wall composed of fine sand, the outer portion closely cemented and somewhat friable, inner portion firmly cemented, smoothly finished on the interior surface; within, and about the apertures, which are formed by the open ends of the tubular portions, often of a reddish-brown color.

Diameter, up to 5 mm.

Distribution.—Brady in the *Challenger* report records this species from one *Porcupine* station off the British Isles in 630 fathoms and from one Atlantic *Challenger* station, No. 78, in 1,000 fathoms east of the Azores. Flint records it from one *Albatross* station, D2569, in 1,782 fathoms off Marthas Vineyard. In the *Albatross* material I have had from the western Atlantic, it has occurred at 14 stations, but all in the area between Georges Bank off Cape Cod southward toward Cape Hatteras. It has not occurred south of this general region. In depth the records range from 568 to 2,033 fathoms, the average around 1,500 fathoms, bottom temperatures range from 36.8 to 39° F., showing rather cold water distribution, but not occurring in the colder region off the Grand Banks of Newfoundland, where, for instance, *Hyperammina subnodosa* is so very abundant.

Astrorhiza angulosa—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°*F.*		
9569	U.S.N.M.	3	D2038....	38 30 30 N.; 69 08 35 W.	2,033	....	glob. oz.....	Few.
9570	U.S.N.M.	2	D2042....	39 33 00 N.; 68 26 45 W.	1,555	38.5	glob. oz.....	Few.
9571	U.S.N.M.	4	D2043....	39 49 00 N.; 68 28 30 W.	1,467	38.5	glob. oz.....	Rare.
9572	U.S.N.M.	1	D2115....	35 49 30 N.; 74 34 45 W.	843	39	m. fne. s....	Rare.
9573	U.S.N.M.	9	D2172....	38 01 15 N.; 73 44 00 W.	568	39	gn. m.......	Few.
9221	U.S.N.M.	10+	D2221....	39 05 30 N.; 70 44 30 W.	1,525	36.9	gy. oz.......	Common.
9222	U.S.N.M.	1	D2228....	37 25 00 N.; 73 06 00 W.	1,582	36.8	br. m.......	Rare.
9223	U.S.N.M.	9	D2229....	37 38 40 N.; 73 16 30 W.	1,423	37.7	glob. oz.....	Few.
9224	U.S.N.M.	1	D2564....	39 22 00 N.; 71 23 30 W.	1,390	37.3	gy. oz.......	Rare.
9574	U.S.N.M.	5	D2569....	39 26 00 N.; 68 03 30 W.	1,782	37	gy. oz.......	Few.
9225	U.S.N.M.	1	D2570....	39 54 00 N.; 67 05 30 W.	1,813	36.8	glob. oz.....	Rare.
9226	U.S.N.M.	10+	D2713....	38 20 00 N.; 70 08 30 W.	1,859	....	br. oz.......	Common.
9227	U.S.N.M.	10+	D2716....	38 29 30 N.; 70 57 00 W.	1,631	....	br. oz.......	Common.
9228	U.S.N.M.	1	D2729....	36 36 00 N.; 74 32 00 W.	679	....	dk. gy. m...	Few.

ASTRORHIZA CRASSATINA H. B. Brady.

Astrorhiza crassatina H. B. Brady, Quart. Journ. Micr. Sci., vol. 21, 1881, p. 46; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 233, pl. 20, figs. 1-9.—Goës, Kõngl. Svensk. Vet. Akad. Handl., vol. 25, No. 9, 1894, p. 13, pl. 2, figs. 11-15; Bull. Mus. Comp. Zoöl., vol. 29, 1896, p. 19.—Flint, Rep. U. S. Nat. Mus., 1897 (1899), p. 265, pl. 2.—Kiaer, Norske Nordhavs. Exp., No. 25, 1899. p. 4.—Rhumbler, Arch. Prot., vol. 3, 1903, p. 220, fig. 42 (in text).—Cushman, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 22, fig. 6 (in text).—Pearcey, Trans. Roy. Soc. Edinburgh, vol. 49, 1914, p. 997.

Rhabdammina crassatina Eimer and Fickert, Zeitschr. Wiss. Zool., vol. 65, 1899, p. 668.

Description.—Test subcylindrical or somewhat irregular, elongate, ends rounded or truncate, with a tubular chamber within, of uneven diameter, contracted; wall thick, composed of fine sand grains, loosely cemented and friable at the surface, more firmly cemented on the interior, occasionally with a larger pebble at one side or irregularly placed or with other foreign bodies; apertures formed by the open ends of the tubular chambers, often more or less closed by fine sand grains.

Length, up to 10 mm.

Distribution.—In general this is a species of cold waters. It is known from the coast of Norway (M. and G. O. Sars), Kars Fjord, 180 fathoms (Norman); Faroe Channel, 530–650 fathoms (Carpenter, Brady), off the Cape of Good Hope (*Challenger*, Brady); Arctic Sea, off Spitzbergen (Goës), Arctic Ocean (Kiaer), from three *Albatross* stations D2570 off Georges Bank, D2586 off Long Island, and 2723 off Chesapeake Bay, 328–1,813 fathoms (Flint), North Pacific (Cushman), and from the Antarctic, 1,775–2,500 fathoms (Pearcey).

In the Atlantic material I have had the species has occurred at about 20 stations, all northward from Cape Hatteras and ranging northward nearly to the Grand Banks. The depths range from 384 to 2,045 fathoms and the bottom temperatures from 36.8° to 41° F.

Astrorhiza crassatina—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
9583	U.S.N.M.	1	D2036....	38 52 40 N.; 69 24 40 W.	1,735	38	glob. oz.....	Few.
9584	U.S.N.M.	10+	D2043....	39 49 00 N.; 68 28 30 W.	1,467	38.5	glob. oz.....	Common.
9585	U.S.N.M.	4	D2097....	37 56 20 N.; 70 57 30 W.	1,917	....	glob. oz.....	Few.
9586	U.S.N.M.	3	D2105....	37 50 00 N.; 73 03 50 W.	1,395	41	glob. oz.....	Few.
9587	U.S.N.M.	1	D2111....	35 09 50 N.; 74 57 40 W.	938	....	b. m........	Rare.
9588	U.S.N.M.	2	D2171....	37 59 30 N.; 73 48 40 W.	444	39.5	gn. m.......	Rare.
9589	U.S.N.M.	2	D2172....	38 01 15 N.; 73 44 00 W.	568	39	gn. m.......	Rare.
9590	U.S.N.M.	6	D2174....	38 15 00 N.; 72 03 00 W.	1,594	....	gy. m.......	Common.
9591	U.S.N.M.	1	D2203....	39 34 15 N.; 71 41 15 W.	705	38.9	gn. m. s.....	Rare.
9592	U.S.N.M.	1	D2213....	39 58 30 N.; 70 30 00 W.	384	39.5	gn. m.......	Rare.
9239	U.S.N.M.	10	D2221....	39 05 30 N.; 70 44 30 W.	1,525	36.9	gy. oz.......	Common.
9240	U.S.N.M.	1	D2222....	39 03 15 N.; 70 50 45 W.	1,537	36.9	gy. oz.......	Rare.
9241	U.S.N.M.	1	D2226....	37 00 00 N.; 71 54 00 W.	2,045	36.8	glob. oz.....	Rare.
9242	U.S.N.M.	3	D2229....	37 38 40 N.; 73 16 30 W.	1,423	37.7	glob. oz.....	Few.
9243	U.S.N.M.	2	D2550....	39 44 30 N.; 70 30 45 W.	1,081	38.5	br. m.......	Few.
9244	U.S.N.M.	10	D2564....	39 22 00 N.; 71 23 30 W.	1,390	37.3	gy. m.......	Abundant.
9245	U.S.N.M.	6	D2570....	39 54 00 N.; 67 05 30 W.	1,813	36.8	glob. oz.....	Abundant.
9246	U.S.N.M.	1	D2571....	40 09 30 N.; 67 09 00 W.	1,356	37.8	glob. oz.....	Few.
9247	U.S.N.M.	1	D2706....	41 28 30 N.; 65 35 30 W.	1,188	....	gy. oz.......	Rare.
9248	U.S.N.M.	3	D2714....	38 22 00 N.; 70 17 30 W.	1,825	....	br. oz.......	Few.
9249	U.S.N.M.	5	D2716....	38 29 30 N.; 70 57 00 W.	1,631	....	br. oz.......	Common.
9250	U.S.N.M.	3	D2729....	36 36 00 N.; 74 32 00 W.	679	....	dk. gn. m....	Few.
6226	U.S.N.M.	2	....	Faroe Channel..........	640	....	....	

ASTRORHIZA GRANULOSA (H. B. Brady.)

Plate 5, fig. 4.

Marsipella granulosa H. B. Brady, Quart. Journ. Micr. Sci., vol. 19, 1879, p. 36, pl. 3, figs. 8, 9.—Bütschli, in Bronn's Klassen und Ordnungen des Thierreichs, vol. 1, 1880, p. 194, pl. 5, fig. 9.

Astrorhiza granulosa H. B. Brady, Quart. Journ. Micr. Sci., vol. 21, 1881, p. 48; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 234, pl. 20, figs. 14–23.—Neumayr. Stämme Thierreichs, vol. 1, 1889, p. 173, fig. 17*d*.—Goës, Bull.

Mus. Comp. Zoöl., vol. 29, 1896, p. 19.—FLINT, Rep. U. S. Nat. Mus., 1897 (1899), p. 265, pl. 1.—RHUMBLER, Arch. Prot., vol. 3, 1903, p. 219, fig. 41 (in text).—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 21, fig. 5 (in text).

Rhabdammina granulosa EIMER and FICKERT, Zeitschr. Wiss. Zool., vol. 65, 1899, p. 667.

Description.—Test generally fusiform, tapering toward the ends, internally with a tubular chamber of nearly uniform diameter running the whole length of the test; wall composed of fine sand grains rather loosely cemented at the exterior, but more firmly fixed on the interior and at the ends, where the color is often a reddish brown, interior smoothly finished, exterior often with foreign particles of various sorts imbedded in the walls; apertures formed by the open ends of the tubular chamber, often obscured by a loose filling of fine sand particles.

Length, up to 7 mm.

Distribution.—Brady described *A. granulosa* from a single *Challenger* station, No. 78, in 1,000 fathoms, east of the Azores. It is also known from the Bay of Biscay (Rhumblër); from three *Albatross* stations off the east coast of the United States, in 1,685–1,781 fathoms (Flint). In the Pacific it is known from the eastern portion off Panama, in 1,201 fathoms (Goës), and off Japan (Cushman).

In the *Albatross* Atlantic material I have examined it has been noted at 25 stations, ranging in depth from 390 to 2,045 fathoms, bottom temperatures from 36.8° to 41° F. These stations range from slightly north of Cape Hatteras to Nova Scotia, with no records at all in all the material south of this region.

Astrorhiza granulosa—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
9593	U.S.N.M.	1	D2036....	38 52 40 N.; 69 24 40 W.	1,735	38	glob. oz.....	Rare.
9594	U.S.N.M.	1	D2038....	38 30 30 N.; 69 08 35 W.	2,033	....	glob. oz.....	Common.
9595	U.S.N.M.	2	D2042....	39 33 00 N.; 68 25 45 W.	1,555	38.5	glob. oz.....	Few.
9596	U.S.N.M.	10+	D2043....	39 49 00 N.; 68 28 30 W.	1,467	38.5	glob. oz.....	Few.
9597	U.S.N.M.	4	D2046....	40 02 49 N.; 68 49 00 W.	407	40	bu. m.......	Rare.
9598	U.S.N.M.	4	D2084....	40 16 50 N.; 67 05 15 W.	1,290	40	bu. m. s.....	Few.
9599	U.S.N.M.	4	D2105....	37 50 00 N.; 73 03 50 W.	1,395	41	glob. oz.....	Rare.
9600	U.S.N.M.	2	D2111....	35 09 50 N.; 74 57 40 W.	938	....	gn. m.......	Rare.
9601	U.S.N.M.	2	D2115....	35 49 30 N.; 74 34 45 W.	843	39	m. fne. s....	Rare.
9602	U.S.N.M.	1	D2172....	38 01 15 N.; 73 44 00 W.	568	39	gn. m.......	Few.
9603	U.S.N.M.	2	D2187....	39 49 30 N.; 71 10 00 W.	420	39.7	gn. m. s.....	Rare.
9604	U.S.N.M.	2	D2203....	39 34 15 N.; 71 41 15 W.	705	38.9	gn. m. s.....	Few.
9251	U.S.N.M.	10+	D2221....	39 05 30 N.; 70 44 30 W.	1,525	36.9	gy. oz.......	Rare.
9252	U.S.N.M.	3	D2226....	37 00 00 N.; 71 54 00 W.	2,045	36.8	glob. oz.....	Common.
9253	U.S.N.M.	10+	D2229....	37 38 40 N.; 73 16 30 W.	1,423	37.7	glob. oz.....	Few.
9254	U.S.N.M.	2	D2234....	39 09 00 N.; 72 03 15 W.	810	38.6	gn. m.......	Few.
9255	U.S.N.M.	4	D2547....	39 54 30 N.; 70 20 00 W.	390	39.6	gn. m.......	Few.
9256	U.S.N.M.	1	D2550....	39 44 30 N.; 70 30 45 W.	1,081	38.5	br. m........	Rare.
9257	U.S.N.M.	10+	D2564....	39 22 00 N.; 71 23 30 W.	1,390	37.3	gy. oz.......	Common.
9258	U.S.N.M.	8	D2570....	39 54 00 N.; 67 05 30 W.	1,813	36.8	glob. oz.....	Common
9259	U.S.N.M.	2	D2571....	40 09 30 N.; 67 09 00 W.	1,356	37.8	gy. glob. oz.	Few.
9260	U.S.N.M.	6	D2713....	38 20 00 N.; 70 08 30 W.	1,859	....	br. oz.......	Common.
9261	U.S.N.M.	10+	D2714....	38 22 00 N.; 70 17 30 W.	1,825	....	br. oz.......	Few.
9262	U.S.N.M.	8	D2716....	38 29 30 N.; 70 57 00 W.	1,631	....	br. oz. for...	Common.
9263	U.S.N.M.	3	D2729....	36 36 00 N.; 74 32 00 W.	679	....	dk. gn. m...	Common.

ASTRORHIZA VERMIFORMIS Goës.

Plate 5, figs. 1–3; plate 6, fig. 6.

Astrorhiza vermiformis Goës, Bull. Mus. Comp. Zoöl., vol. 29, 1896, p. 20, pl. 1, fig. 9.—Rhumbler, Arch. Prot., vol. 3, 1903, p. 218, fig. 40 (in text).

Description.—Test tubular, usually bent, wall thick, made up of dark grayish mud, before drying more or less flexible; the dried specimens with numerous fine crevices in the wall, usually annular or partially so, apertures at the ends of the tube, which is somewhat tapering, consisting of an unrestricted circular or compressed opening.

Length, 10–13 mm.

Distribution.—Type-specimens from *Albatross* station D2384, Gulf of Mexico, 28° 45′ N., 88° 15′ W., about 58 miles south-southeast from the middle mouth of the Mississippi, in 940 fathoms. I have had material from this station and also from the neighboring one—D2385, Gulf of Mexico, 28° 51′ N., 88° 18′ W., in 730 fathoms.

Astrorhiza vermiformis—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
9605	U.S.N.M.	10+	D2384....	28 45 00 N.; 88 15 30 W.	940	39.6	br. gy. m....	Common.
9606	U.S.N.M.	2	D2385....	28 51 00 N.; 88 18 00 W.	730	40.1	gy. m.......	Few.

Genus RHABDAMMINA Carpenter, 1869.

Rhabdammina M. Sars, Forh. Selsk. Christiania, 1868, p. 248 (*nomen nudum*).—W. B. Carpenter (type, *R. abyssorum* W. B. Carpenter), Ann. Mag. Nat. Hist., ser. 4, vol. 4, 1869, p. 288; Proc. Roy. Soc. London, vol. 18, 1869, p. 60.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 266.—Rhumbler, Arch. Prot., vol. 3, 1903, p. 261.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 23.

Astrorhiza (*part*)+*Rhizammina* (part) Eimer and Fickert, Zeitschr. Wiss. Zool., vol. 65, 1899, p. 666.

Description.—Test free, either radiate, subcylindrical or branching, wall arenaceous usually rather coarsely finished on the exterior, firmly cemented; open ends of the arms serving as apertures.

From the records this genus seems to be characteristic of cool waters and of deep-sea conditions. The arms are easily broken and specimens are usually incomplete. The species all have a wide distribution.

RHABDAMMINA ABYSSORUM W. B. Carpenter.

Plate 6, fig. 1; plate 7, fig. 1.

Rhabdammina abyssorum M. SARS, Förh. Vid. Selsk. Christiania, 1868, p. 248 (*nomen nudum*).—W. B. CARPENTER, Ann. Mag. Nat. Hist., ser. 4, vol. 4, 1869, p. 288; Proc. Roy. Soc. London, vol. 18, 1869, p. 60.—G. O. SARS, Förh. vid. Selsk. Christiania, 1871, pp. 250, 251.—CARPENTER, The Microscope, ed. 6, 1881, pp. 562, 563, figs. 321*c*, *d* (in text).—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 266, pl. 21, figs. 1-13.—DE FOLIN, Le Naturaliste, vol. 9, 1887, p. 127, fig. 12*a*.—A. AGASSIZ, Bull. Mus. Comp. Zoöl., vol. 15, 1888, pp. 162, 163, figs. 492, 493 (in text).—NEWMAYR, Stämme Thierreichs, vol. 1, 1889, p. 173, fig. 17*a* (in text).—EGGER, Abh. Bay. Akad. Wiss. München, vol. 18, 1893, p. 255, pl. 4, fig. 31.—Goës, Köngl. Svensk. Vet. Akad. Handl., vol. 25, No. 9, 1894, p. 19, pl. 4, figs. 67, 68.—SCHLUMBERGER, Mém. Soc. Zool. France, vol. 7, 1894, p. 254.—Goës, Bull. Mus. Comp. Zoöl., vol. 29, 1896, p. 21.—KIAER, Norske Nordhavs. Exped., No. 25, 1899, p. 4.—FLINT, Rep. U. S. Nat. Mus., 1897 (1899), p. 271, pl. 12, fig. 2.—RHUMBLER, Arch. Prot., vol. 3, 1903, p. 264, fig. 108 (in text).—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 24, figs. 8-10 (in text).—AWERINZEW, Mem. Acad. Imp. Sci. St. Petersburg, ser. 8, vol. 29, No. 3, 1911, p. 10.—PEARCEY, Trans. Roy. Soc. Edinburgh, vol. 49, 1914, p. 998.—HERON-ALLEN and EARLAND, Trans. Linn. Soc. London, vol. 11, pt. 13, 1916, p. 221.

Rhabdammina abyssorum, var. *robusta* Goës, Köngl. Svensk. Vet. Akad. Handl., vol. 19, No. 4, 1882, p. 143, pl. 12, figs. 430, 431.

Astrorhiza abyssorum EIMER and FICKERT, Zeitschr. Wiss. Zool., vol. 65, 1899, p. 666.

Description.—Test free, consisting of a central subglobular chamber with typically three radiating arms, varying in number to five, of nearly uniform diameter, with no divisions; when three, usually in the same plane but the accessory arms above this number often added in a different plane; wall of sand grains, firmly cemented, with a reddish brown cement often giving a decided tinge of color to the whole test, interior fairly smooth and reddish from the color of the cement, exterior roughly finished; apertures formed by the circular openings at the ends of the tubular arms.

Length of test with the arms, up to 20 mm.

Distribution.—In colder waters this is a very widely distributed species. It is recorded from the Arctic off Greenland, Norway, and to the north of Siberia about Great Britain, Baffins Bay, Gulf of Mexico, and the Caribbean Sea. On the western coast of the Atlantic it has occurred frequently in the *Albatross* material. In the long list the stations range in depth from 82 to 2,045 fathoms and the bottom temperatures from 36.8° to 41° F., with a single station in the Gulf of Mexico 51.6° at 196 fathoms.

The best development of the species is in the colder water from Cape Hatteras northward to the Newfoundland Banks.

The following variety is distinguished:

Rhabdammina abyssorum—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°*F.*		
9783	U.S.N.M.	10+	D2003....	37 16 30 N.; 74 20 36 W.	641	....	....	Common.
9784	U.S.N.M.	5	D2035....	39 26 16 N.; 70 02 37 W.	1,362	....	glob. oz.....	Few.
9785	U.S.N.M.	10+	D2046....	40 02 49 N.; 68 49 00 W.	407	40	bu. m.......	Common.
9786	U.S.N.M.	4	D2048....	40 02 00 N.; 68 50 30 W.	547	39	crs. m. g....	Few.
9787	U.S.N.M.	5	D2072....	41 53 00 N.; 65 35 00 W.	858	39	gy. m.......	Few.
9788	U.S.N.M.	3	D2097....	37 56 20 N.; 70 51 30 W.	1,917	....	glob. oz.....	Few.
9789	U.S.N.M.	1	D2105....	37 50 00 N.; 73 03 50 W.	1,395	41	glob. oz.....	Rare.
9790	U.S.N.M.	1	D2110....	35 12 10 N.; 74 57 15 W.	516	40	bu. m.......	Rare.
9791	U.S.N.M.	2	D2111....	35 09 50 N.; 74 57 40 W.	938	....	gn. m.......	Few.
9792	U.S.N.M.	3	D2171....	37 59 30 N.; 73 48 40 W.	444	39.5	gn. m.	Few.
9793	U.S.N.M.	6	D2172....	38 01 15 N.; 73 44 00 W.	568	39	gn. m.......	Few.
9794	U.S.N.M.	10	D2187....	39 49 30 N.; 71 10 00 W.	420	39.7	gn. m. s.....	Common.
9795	U.S.N.M.	1	D2189....	39 49 30 N.; 70 26 00 W.	600	39.7	gn. m. s.....	Few.
9449	U.S.N.M.	10+	D2214....	39 57 00 N.; 70 32 00 W.	475	39.5	gn. m.......	Common.
9450	U.S.N.M.	1	D2221....	39 05 30 N.; 70 44 30 W.	1,525	36.9	gy. oz.......	Few.
9451	U.S.N.M.	1	D2226....	37 00 00 N.; 71 54 00 W.	2,045	36.8	glob. oz.....	Few.
9453	U.S.N.M.	1	D2234....	39 09 00 N.; 72 03 15 W.	810	38.6	gn. m.......	Few.
9452	U.S.N.M.	8	D2237....	39 12 17 N.; 72 09 30 W.	520	39.5	gn. m.......	Common.
9796	U.S.N.M.	9	D2383....	28 32 00 N.; 88 06 00 W.	1,181	39.8	br. gn. m....	Common.
9454	U.S.N.M.	2	D2399....	28 44 00 N.; 86 18 00 W.	196	51.6	gy. m.......	Few.
9455	U.S.N.M.	10	D2504....	44 23 00 N.; 61 22 45 W.	82	40.6	bk. m. g.....	Common.
9456	U.S.N.M.	10+	D2547....	39 54 30 N.; 70 20 00 W.	390	39.6	gn. m.......	Common.
9457	U.S.N.M.	6	D2550....	39 44 30 N.; 70 30 45 W.	1,081	38.5	br. m.......	Common.
9458	U.S.N.M.	4	D2552....	39 47 07 N.; 70 35 00 W.	721	39.6	gy. oz.......	Few.
9459	U.S.N.M.	7	D2584....	39 05 30 N.; 72 23 20 W.	541	39.5	gy. m.......	Few.
9797	U.S.N.M.	2	D2678....	32 40 00 N.; 76 40 30 W.	731	38.7	lt. gy. oz....	Few.
9460	U.S.N.M.	10+	D2680....	39 50 00 N.; 70 26 00 W.	555	....	No specimen	Common.
9461	U.S.N.M.	2	D2696....	46 53 30 N.; 45 05 30 W.	98	....	gy. s. bk. sp..	Few.
9462	U.S.N.M.	8	D2697....	47 40 00 N.; 47 35 30 W.	206	....	gn. m. bk. sp	Common.
9463	U.S.N.M.	5	D2714....	38 32 00 N.; 70 17 30 W.	1,826	....	br. oz.......	Few.
9464	U.S.N.M.	1	D2716....	38 29 30 N.; 70 57 00 W.	1,631	....	br. oz. for...	Rare.
9465	U.S.N.M.	1	D2731....	36 45 00 N.; 74 28 00 W.	781	....	gy. oz.......	Rare.

RHABDAMMINA ABYSSORUM W. B. Carpenter, var. RADIATA Cushman.

Rhabdammina abyssorum W. B. Carpenter, var. *radiata* Cushman, Proc. U. S. Nat. Mus., vol. 51, 1917, p. 652.

Description.—Test with a globular central chamber from which radiate numerous arms with annular constrictions, largest diameter of the arms near the central chamber, thence tapering toward the outer end; wall of fine texture, smoother than the typical, reddish brown in color.

Distribution.—Although comparatively rare in the Atlantic, specimens of this variety were found in material from two *Albatross* stations, D2383, 1,181 fathoms, bottom temperature 39.8° F., and D2385, 730 fathoms, bottom temperature 40.1° F. These stations are both in the northern part of the Gulf of Mexico.

The types were described from *Albatross* station D5654 in 805 fathoms from the Gulf of Boni. In the deep water of the East Indian region of the Pacific this variety is met with in considerable numbers, replacing the typical form but in the Atlantic it is apparently rare.

Rhabdammina abyssorum, var. radiata—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
9798	U.S.N.M.	4	D2383....	28 32 00 N.; 88 06 00 W.	1,181	39.8	br.gn.m....	Few.
9798	U.S.N.M.	3	D2385....	28 51 00 N.; 88 18 00 W.	730	40.1	gy. m.......	Few.
9466	U.S.N.M.	1	H58......	17 45 20 N.; 65 35 35 W.	1,345	....	oz. for.......	Rare.

RHABDAMMINA IRREGULARIS W. B. Carpenter.

Plate 8, fig. 1.

Rhabdammina irregularis W. B. CARPENTER, Proc. Roy. Soc. London, vol. 18, 1869, p. 60.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 268, pl. 21, fig. 9.—Goës, Bull. Mus. Comp. Zoöl., vol. 29, 1896, p. 21.—RHUMBLER, Arch. Prot., vol. 3, 1903, p. 263, fig. 106 (in text).—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 26, figs. 11, 12 (in text).

Description.—Test made up of a dichotomously branching tubular chamber, of nearly uniform diameter; wall of firmly cemented sand grains, exterior rather rough, interior smoothly finished; ends of the tubes serving as apertures; color usually a yellowish or reddish brown. Length, up to 37.5 mm.

Distribution.—Very little is known of the distribution of this species in the Atlantic. It was described by Carpenter from material dredged on the *Lightning* expedition and is also recorded from the Bay of Biscay from *Le Travailleur* dredgings by Norman and appearing in the *Challenger* report as a note by Brady as follows: "I am informed by the Rev. A. M. Norman that a variety with branching arms was also obtained in the dredging operations of *Le Travailleur* in the Bay of Biscay, in 1880."

In the Pacific in various places, especially in the region along the western coast of America northward to the Gulf of California it is often very abundant and again in some parts of the deep water of the East Indian region.

As I have already mentioned, in the Pacific material there seems to be some doubt as to the complete form of this species as all material appears to be but fragmentary and broken, the line of weakness seeming to come just above the point of branching.

RHABDAMMINA CORNUTA H. B. Brady.

Plate 6, figs. 2–5.

Astrorhiza cornuta H. B. BRADY, Quart. Journ. Micr. Sci., vol. 19, 1879, p. 43, pl. 4, figs. 14, 15.

Rhabdammina cornuta H. B. BRADY, Proc. Roy. Soc. Edinburgh, vol. 11, 1882, p. 714; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 270, pl. 22, figs. 11–13.—FLINT, Ann. Rep. U. S. Nat. Mus., 1897 (1899), p. 271, pl. 14, fig. 2.—RHUMBLER, Arch. Prot., vol. 3, 1903, p. 264, fig. 107 (in text).—PEARCEY, Trans. Roy. Soc. Edinburgh, vol. 49, 1914, p. 998.

Rhizammina cornuta EIMER and FICKERT, Zeitschr. Wiss. Zool., vol. 65, 1899, p. 667.

Description.—Test free, typically consisting of a central inflated, subspherical or irregular body with numerous short arms radiating from various points of the surface, sometimes irregular and elongate, irregularly branching; wall thin, composed of a single layer of rather coarse sand grains with a brownish cement, firmly joined, exterior irregular, arms in the subglobular form usually ending in single circular orifices; those of the elongate form usually with one or more chitinous tubes, bifurcating at the tip.

Length of the elongate form, up to 6 mm.; the diameter of the subglobular form rarely exceeding 1.5 mm.

Distribution.—Brady records this species from four Atlantic stations, south of the Rockall Bank, 1,215 fathoms; off the west coast of Ireland, 816 fathoms; from the warm area of the Faroe Channel, 532 fathoms, and southeast of Pernambuco, Brazil, 350 fathoms. Flint records it from the east coast of the United States and from near old Providence Island in the Caribbean. I have noted it from 12 stations in the *Albatross* material from the region of Georges Banks to Cape Hatteras, stations ranging in depth from 515 to 2,045 fathoms and bottom temperatures from 34.4° to 39.7° with a single station 45° F.

Practically all the material off the shores of the United States is the subglobular form with the short radiating arms figured by Flint from the same region. The elongate form may prove to be a different species, as it has very different characters in the bifurcating arms, etc. I have not, however, had an opportunity to study any except dried material and in this the arms are lacking.

Rhabdammina cornuta—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
9801	U.S.N.M.	3	D2052....	39 40 05 N.; 69 21 25 W.	1,098	45	glob. oz.....	Few.
9800	U.S.N.M.	10+	D2072....	41 53 00 N.; 65 35 00 W.	858	39	gn. m.......	Common.
9802	U.S.N.M.	10+	D2115....	35 49 30 N.; 74 34 45 W.	843	39	m. fne. s....	Common.
9803	U.S.N.M.	2	D2189....	39 49 30 N.; 70 26 00 W.	600	39.7	gn. m. s.....	Few.
9804	U.S.N.M.	10+	D2202....	39 38 00 N.; 71 39 45 W.	515	39.1	gn. m.......	Few.
9805	U.S.N.M.	2	D2203....	39 34 15 N.; 71 41 15 W.	705	38.9	gn. m. s.....	Rare.
9444	U.S.N.M.	6	D2226....	37 00 00 N.; 71 54 00 W.	2,045	36.8	glob. oz.....	Rare.
9490	U.S.N.M.	10+	D2234....	39 09 00 N.; 72 03 15 W.	810	38.6	gn. m.......	Few.
9445	U.S.N.M.	2	D2531....	40 42 00 N.; 66 33 00 W.	852	34.4	gy. m.......	Rare.
9446	U.S.N.M.	5	D2550....	39 44 30 N.; 70 30 45 W.	1,081	38.5	br. m.......	Rare.
9447	U.S.N.M.	1	D2552....	39 47 07 N.; 70 35 00 W.	721	39.6	gy. oz.......	Rare.
9448	U.S.N.M.	1	D2682....	39 38 00 N.; 70 22 00 W.	1,004	....	gn. m. s.....	Rare.

RHABDAMMINA CORNUTA H. B. Brady, var. SPICULOTESTA, new variety.

Description.—Test differing from the typical form in the material used in the construction of the test, sponge spicules being used almost exclusively, the shape of the body and the angles of the arms being largely determined by this fact, the spicules being unadapted to a curved surface.

Distribution.—Type-specimens from *Albatross* station D2150 in 382 fathoms in the Caribbean Sea (13° 34′ 45″ N.; 81° 21′ 10″ W.), bottom temperature 45.75° F.; bottom given as white coarse sand.

Superficially this variety suggests the figures of *Psammosphaera rustica* due to the similarity in the contour of the test produced by the inflexibility in the use of the larger spicules. The arms likewise are modified and instead of curving bends in them they are very much angled and very awkward appearing. Almost no sand grains are used in the test of the specimens from this station, although other arenaceous species from the same dredging seem to be normal in this particular.

Rhabdammina cornuta, var. spiculotesta—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
9906	U.S.N.M.	10+	D2150....	° ′ ″ ° ′ ″ 13 34 45 N.; 81 21 10 W.	382	°F. 45.75	wh. crs. s....	Common.

RHABDAMMINA LINEARIS H. B. Brady.

Plate 7, figs. 2–5.

Rhabdammina linearis H. B. Brady, Quart. Journ. Micr. Sci., vol. 19, 1879, p. 37, pl. 3, figs. 10, 11.—Bütschli, in Bronn, Klassen und Ordnungen der Thierreichs, vol. 1, 1880, p. 194, pl. 5, fig. 10.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 269, pl. 22, figs. 1–6.—A. Agassiz, Bull. Mus. Comp. Zoöl., vol. 15, 1888, p. 163, fig. 494 (in text).—Goës, Köngl. Svensk. Vet. Akad. Handl., vol. 25, No. 9, 1894, p. 18, pl. 4, figs. 65, 66.—Flint, Rep. U. S. Nat. Mus., 1897 (1899), p. 271, pl. 14, fig. 1.—Rhumbler, Arch. Prot., vol. 3, 1903, p. 262, fig. 104 (in text).—Cushman, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 28, figs. 14*af* (in text).

Description.—Test free, elongate, straight or irregularly bent, consisting of a central, subglobular chamber from which cylindrical arms extend in opposite directions, giving the appearance of a cylindrical tube swollen in the middle; wall composed of sand grains firmly cemented, that of the central chamber less thick than that of the arms; rather smoothly finished both within and without; aperture formed by the open ends of the tubes; color variable according to the material used in building the test.

Length, up to 10 mm.

Distribution.—The following stations are given by Brady in the *Challenger* report, Hardinger Fiord, Norway, 126 fathoms; west coast of Ireland, 816 fathoms; off Sombrero Island, West Indies, 450 fathoms; off Culebra Island, West Indies, 390 fathoms; off Pernambuco, Brazil, 675 fathoms; and east of Buenos Aires, 1,900 fathoms. Goës records it off Greenland in 100 meters and from the Caribbean Sea, 211 to 940 fathoms. Flint gives two *Albatross* stations, D2570 in 1,813 fathoms, southeast of Georges Banks and D2760 in 1,019 fathoms, off Bahia, Brazil.

In my study of the material from the North Pacific it was found to be extremely rare, the two stations of the *Challenger* from off Japan and in the deeper portion of the Pacific being its only records. It is pleasureable, therefore, to examine the *Albatross* material from the Western Atlantic and find that this hitherto comparatively rare species occurs very generally and often in considerable numbers. I have made records of its occurrence at 33 stations. There are two forms which may be noted although perhaps not worthy of varietal rank. One is more or less robust with the whole test nearly straight, the other much more slender and the whole test often very irregularly bent. These latter seem to be more characteristic of warmer waters, the depths range from 196 to 2,045 fathoms and bottom temperatures from 36.8° to 51.6° F., the latter being at the shallowest station in the Gulf of Mexico. The species is most common in material from Georges Bank southward to Cape Hatteras but occurs in the Gulf of Mexico and the Caribbean Sea.

Rhabdammina linearis—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
9817	U.S.N.M	1	D2035....	39 26 16 N.; 70 02 37 W.	1,362	....	glob. oz.....	Rare.
9818	U.S.N.M.	10+	D2036....	38 52 40 N.; 69 24 40 W.	1,735	38	glob. oz.....	Common.
9819	U.S.N.M.	3	D2038....	38 30 30 N.; 69 08 35 W.	2,033	....	glob. oz.....	Few.
9820	U.S.N.M.	6	D2041....	39 22 50 N.; 68 25 00 W.	1,608	38	glob. oz.....	Few.
9821	U.S.N.M.	2	D2042....	39 33 00 N.; 68 26 45 W.	1,555	38.5	glob. oz.....	Few.
9822	U.S.N.M.	4	D2043....	39 49 00 N.; 68 28 30 W.	1,467	38.5	glob. oz.....	Few.
9835	U.S.N.M.	1	D2072....	41 53 00 N.; 65 35 00 W.	858	39	gy. m........	Rare.
9823	U.S.N.M.	8	D2097....	37 56 20 N.; 70 57 30 W.	1,917	....	glob. oz.....	Common.
9824	U.S.N.M.	1	D2105....	37 50 00 N.; 73 03 50 W.	1,395	41	glob. oz.....	Rare.
9825	U.S.N.M.	3	D2106....	37 41 20 N.; 73 03 20 W.	1,497	42.5	glob. oz.....	Few.
9826	U.S.N.M.	1	D2111....	35 09 50 N.; 74 57 40 W.	938	....	gn. m........	Rare.
9827	U.S.N.M.	3	D2116....	35 45 23 N.; 74 31 25 W.	888	39	bu. m. fne. s..	Few.
9828	U.S.N.M.	2	D2150....	13 34 15 N.; 81 21 10 W.	382	45.75	wh. crs. s....	Few.
9829	U.S.N.M.	6	D2174....	38 15 00 N.; 72 03 00 W.	1,594	....	gy. m........	Few.
9830	U.S.N.M.	1	D2203....	39 34 15 N.; 71 41 15 W.	705	38.9	gn. m. s......	Rare.
9467	U.S.N.M.	9	D2221....	39 05 30 N.; 70 44 30 W.	1,525	36.9	gy. oz........	Common.
9468	U.S.N.M.	2	D2222....	34 03 15 N.; 70 50 45.W.	1,537	36.9	gy. oz........	Few.
9469	U.S.N.M.	7	D2226....	37 00 00 N.; 71 54 00 W.	2,045	36.8	glob. oz.....	Few.
9470	U.S.N.M.	1	D2228....	37 25 00 N.; 73 06 00 W.	1,582	36.8	br. m........	Rare.
9471	U.S.N.M.	2	D2229....	37 38 40 N.; 73 16 30 W.	1,423	37.7	glob. oz.....	Few.
9831	U.S.N.M.	4	D2383....	28 32 00 N.; 88 06 00 W.	1,181	39.6	br. gn. m.	Few.
9832	U.S.N.M.	3	D2385....	28 51 00 N.; 88 18 00 W.	730	40.1	gy. m........	Few.
9833	U.S.N.M.	1	D2398....	28 45 00 N.; 86 26 00 W.	227	48.6	gy. m........	Rare.
9472	U.S.N.M.	1	D2399....	28 44 00 N.; 86 18 00 W.	196	51.6	gy. m........	Rare.
9473	U.S.N.M.	1	D2562....	39 15 30 N.; 71 25 00 W.	1,434	37.3	gy. oz........	Rare.
9474	U.S.N.M.	3	D2564....	39 22 00 N.; 71 23 30 W.	1,390	37.3	gy. oz........	Few.
9475	U.S.N.M.	2	D2570....	39 54 00 N.; 67 05 30 W.	1,813	36.8	glob. oz.....	Few.
9834	U.S.N.M.	4	D2643....	25 25 00 N.; 79 55 15 W.	211	43.1	gy. s.........	Few.
9476	U.S.N.M.	2	D2713....	38 20 00 N.; 70 08 30 W.	1,859	....	br. oz........	Few.
9477	U.S.N.M.	1	D2714....	38 22 00 N.; 70 17 30 W.	1,825	....	br. oz........	Rare.
9478	U.S.N.M.	5	D2716....	38 29 30 N.; 70 57 00 W.	1,631	....	br. oz. for...	Few.
9479	U.S.N.M.	2	D2751....	16 54 00 N.; 63 12 00 W.	687	40	br. glob. oz..	Few.
9480	U.S.N.M.	3	H58......	17 45 20 N.; 65 35 35 W.	1,345	....	oz. for.......	Rare.

RHABDAMMINA DISCRETA H. B. Brady.

Plate 11, fig. 1.

Rhabdopleura species G. M. DAWSON, Can. Nat., vol. 5, 1870, p. 177, fig. 7.

Rhabdopleura abyssorum G. M. DAWSON, Amer. Journ. Sci., vol. 1, 1871, p. 206, fig. 7; Ann. Mag. Nat. Hist., ser. 4, vol. 7, 1871, p. 86, fig. 7.

Rhabdammina discreta H. B. BRADY, Quart. Journ. Micr. Sci., vol. 21, 1881, p. 48; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 268, pl. 22, figs. 11-13.—CHAPMAN, Proc. Zool. Soc. London, 1895, p. 14.—GOËS, Bull. Mus. Comp. Zoöl., vol. 29, 1896, p. 21, pl. 1, figs. 13, 14.—FLINT, Rep. U. S. Nat. Mus., 1897 (1899), p. 271, pl. 13.—EIMER and FICKERT, Zeitschr. Wiss. Zool., vol. 65, 1899, p. 668.—RHUMBLER, Arch. Prot., vol. 3, 1903, p. 263, fig. 105 (in text).—BAGG, Proc. U. S. Nat. Mus., vol. 34, 1908, p. 125.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 27, fig. 13 (in text).—PEARCEY, Trans. Roy. Soc. Edinburgh, vol. 49, 1914, p. 998.

Description.—Test free, straight, cylindrical, constricted somewhat at irregular intervals exteriorly, but the chamber within of nearly uniform diameter throughout; wall composed of sand grains firmly cemented, exteriorly rough but the interior rather smoothly finished; open ends of the tube serving as apertures; color variable, depending upon the material used in the construction of the test.

Length, indefinite, up to 25 mm.

Distribution.—It has been thought that this species is rather characteristic of cold water. It is found off Greenland from 350 to 1,000 meters (Goës) and Brady records it from the same region in 20 fathoms. Pearcey records it as typical and in plenty in 2,620 and 2,700 fathoms in the Antarctic. Flint records it from the western Atlantic, *Albatross* D2731, in 781 fathoms off Chesapeake Bay.

In the *Albatross* material I have been able to examine it has occurred from the latitude of Georges Banks southward along the coast, in the Gulf of Mexico, the Carribbean Sea, and off the coast of South America. Depths range from 410 to 2,045 fathoms and bottom temperatures from 35.7° to 45.75° F.

It is worth noting that it is lacking in the material I have examined from the very cold water north of the Newfoundland Banks, and Awerinzew does not record it in his paper in the Siberian material. It therefore is probably not as much limited to cold temperatures as has been supposed.

Specimens always give the impression that they are broken and incomplete as though they were but the arms of some larger arenaceous form that is broken in dredging but this may be only suggestive.

Rhabdammina discreta—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
9807	U.S.N.M.	1	D2035....	39 26 16 N.; 70 02 37 W.	1,362	....	glob. oz.....	Few.
9808	U.S.N.M.	7	D2115....	15 49 20 N.; 74 34 45 W.	843	39	m. fne. s....	Few.
9809	U.S.N.M.	1	D2140....	17 36 10 N.; 76 46 05 W.	966	39.7	S............	Rare.
9810	U.S.N.M.	1	D2208....	39 34 15 N.; 71 41 15 W.	705	38.9	gn. m. s.....	Few.
9481	U.S.N.M.	1	D2226....	37 00 00 N.; 71 54 00 W.	2,045	36.8	glob. oz.....	Few.
9811	U.S.N.M.	10+	D2383....	28 32 00 N.; 88 06 00 W.	1,181	39.8	br. gn. m....	Common.
9812	U.S.N.M.	6	D2384 ...	28 45 00 N.; 88 15 30 W.	940	39.6	br. gy. m....	Common.
9813	U.S.N.M.	8	D2385....	28 51 00 N.; 88 18 00 W.	730	40.1	gy. m.......	Common.
9814	U.S.N.M.	1	D2678....	32 40 00 N.; 76 40 30 W.	731	35.7	lt. gy. oz....	Few.
9482	U.S.N.M.	3	D2714....	38 22 00 N.; 70 17 30 W.	1,825	....	br. oz.......	Few.
9483	U.S.N.M.	1	D2716....	38 29 30 N.; 70 57 00 W.	1,631	....	br. oz. for...	Rare.
9484	U.S.N.M.	10+	D2729....	36 36 00 N.; 74 32 00 W.	679	....	dk. gy. m...	Common
9485	U.S.N.M.	3	D2731....	36 45 00 N.; 74 28 00 W.	781	....	gy. oz.......	Common.
9486	U.S.N.M.	2	D2751....	16 54 00 N.; 63 12 00 W.	687	40	bu. glob. oz.	Few.
9487	U.S.N.M.	10+	H58......	17 45 20 N.; 65 35 35 W.	1,345	....	oz. for.......	Common.
9488	U.S.N.M.	1	H79......	14 20 30 N.; 63 10 00 W.	821	....	w. s. sh. for..	Rare.
9489	U.S.N.M.	2	H86......	12 58 40 N.; 62 48 00 W.	1,635	....	bu. m. for bk. sh.	Rare.
6266	U.S.N.M.	....	Valorous No. 6.	....	410	....	....	

RHABDAMMINA DISCRETA H. B. Brady, var. SPICULOSA, new variety.

Description.—Test different from the typical in the construction of the test which in the variety is composed almost wholly of fragments of sponge spicules, the other characters such as the constrictions of the wall being typical.

Distribution.—Type-specimens from *Albatross* station D2150 in 382 fathoms in the Caribbean Sea (13° 34′ 45″ N.; 81° 21′ 10″ W.) bottom temperature 45.75° F.; bottom given in the record as white, coarse sand.

Although the main material of the test is spicules, the characteristic reddish brown cement is used and the test as a whole has the appearance of typical specimens except for the smoothness of the exterior until a close examination is made. Instead of long acerose spicules being used, as is the case with the variety of *R. cornuta* obtained from this station, the spicules are all short and broken.

Rhabdammina discreta. var. spiculosa—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
9816	U.S.N.M.	10+	D2150....	13 34 45 N.; 81 21 10 W.	382	45.75	wh. crs. s...	Common.

Genus MARSIPELLA Norman, 1878.

Proteonina W. B. Carpenter, Proc. Roy. Soc. London, vol. 18, 1869, p. 60 (not *Proteonina* Williamson, 1858).

Marsipella Norman (type, *M. elongata* Norman), Ann. Mag. Nat. Hist., ser. 5, vol. 1, 1878, p. 281.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 264.—Eimer and Fickert (part), Zeitschr. Wiss. Zool., vol. 65, 1899, p. 668.—Rhumbler, Arch. Prot., vol. 3, 1903, p. 265.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 29.—Heron-Allen and Earland, Journ. Roy. Micr. Soc., 1912, p. 388.—Rhumbler, Plankton Exped., Foraminiferen, pt. 2, 1913, p. 382.

Description.—Test free, tubular, cylindrical or fusiform, sometimes recurved at the ends, wall composed wholly or in part of sponge spicules, or in part of sand grains, thin, firmly cemented; aperture formed by the open ends of the tube or in some cases closed anteriorly by a loosely aggregated knob of spicules.

The discovery by Heron-Allen and Earland in *M. cylindrica* of definite apertured "head" with a bulbous mass of sponge spicules gives rise to the question as to the completeness of many of our dredged specimens. The description of the genus is modified very nearly as suggested by Heron-Allen and Earland in their paper.[1]

MARSIPELLA ELONGATA Norman.

Plate 8, figs. 2, 3.

Proteonina, species, W. B. Carpenter, Proc. Roy. Soc. London, vol. 18, 1869, p. 60.

Marsipella elongata Norman, Ann .Mag. Nat. Hist., ser. 5, vol. 1, 1878, p. 281, pl. 16, fig. 7.—Carpenter, The Microscope, ed. 6, 1881, p. 561, figs. 320*d-f*.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 265, pl. 24, figs. 10–19.—Chapman, Proc. Zool. Soc. London, 1895, p. 13.—Flint, Rep. U. S. Nat. Mus., 1897 (1899), p. 270, pl. 12, fig. 1.—Rhumbler, Arch. Prot., vol. 3, 1903, p. 265, fig. 110 (in text); Plankton Exped., Foraminiferen, pt. 1, 1909 (1911), pl. 2, fig. 21; pt. 2, 1913, p. 382.

Description.—Test elongate, somewhat fusiform, irregularly curved, thickest in the central portion and gradually tapering toward the ends walls composed of sponge spicules with the central thicker portion covered with sand grains, spicules almost exclusively forming the ends of the tubes, laid together lengthwise and cemented firmly in place; aperture at the ends of the tube.

Length, up to 8 mm.

Distribution.—Brady recorded this species from the Faroe Channel, 440 to 542 fathoms, on Rockall Bank, 54 fathoms and southward 630 fathoms; west of Valentia, off southwest Ireland, 808 fathoms; off Gomera, Canary Islands, 620 fathoms; off the Azores, 900 fathoms; and off Pernambuco, Brazil, 350 fathoms. Flint records it from three *Albatross* stations, D2150, in 382 fathoms near Old Providence Island, Caribbean Sea; D2383, in 1,181 fathoms northern portion of the Gulf of Mexico; and D2677, in 478 fathoms off Cape Fear. Rhumbler records it from off the Hebrides.

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[1] Journ. Roy. Micr. Soc., 1912, p. 388.

In the *Albatross* material I have examined it has occurred at D2150, the station recorded by Flint and at 10 stations along the coast from the Georges Banks to the Virginia Capes, depths ranging from 428 to 1,608 fathoms and bottom temperatures from 34.4° to 40° F.

Marsipella elongata—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°*F.*		
9716	U.S.N.M.	3	D2018....	37 12 32 N.; 74 20 04 W.	788	39	bu. m.......	Rare.
9717	U.S.N.M.	1	D2041....	39 22 50 N.; 68 25 00 W.	1,608	38	glob. oz.....	Rare.
9718	U.S.N.M.	1	D2072....	41 53 00 N.; 65 35 00 W.	858	39	gy. m.......	Rare.
9719	U.S.N.M.	1	D2150....	13 34 45 N.; 81 21 10 W.	882	45.75	wh. crs. s....	Rare.
9720	U.S.N.M.	1	D2204....	39 30 30 N.; 71 44 30 W.	728	39.1	br. m.......	Rare.
9721	U.S.N.M.	1	D2205....	39 35 00 N.; 71 18 45 W.	1,073	38.1	gy. oz.......	Rare.
9722	U.S.N.M.	2	D2212....	39 59 20 N.; 70 30 45 W.	428	40	gn. m.......	Rare.
9365	U.S.N.M.	1	D2222....	39 03 15 N.; 70 50 45 W.	1,537	36.9	gy. oz.......	Rare.
9366	U.S.N.M.	3	D2531....	40 42 00 N.; 66 33 00 W.	852	34.4	gy. m.......	Rare.
9367	U.S.N.M.	6	D2550....	39 44 30 N.; 70 30 45 W.	1,081	38.5	br. m.......	Rare.
9368	U.S.N.M.	1	D2562....	39 15 30 N.; 71 25 00 W.	1,434	37.3	gy. oz.......	Rare.
6258	U.S.N.M.	10	Porcupine 47.	....	540	....	....	

MARSIPELLA CYLINDRICA H. B. Brady.

Plate 8, figs. 4–6; plate 9, figs. 8, 9.

Marsipella cylindrica H. B. BRADY, Proc. Roy. Soc. Edinburgh, vol. 11, 1882, p. 714; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 265, pl. 24, figs. 20–22.—RHUMBLER, Arch. Prot., vol. 3, 1903, p. 265, fig. 109 (in text).—GODDARD and JENSEN, Proc. Linn. Soc. N. S. Wales, vol. 32, 1908, p. 301.—HERON-ALLEN and EARLAND, Journ. Quekett Micr. Club, ser. 2, vol. 10, 1909, pl. 35, fig. 11.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 30, figs. 15, 16 (in text).—HERON-ALLEN and EARLAND, Journ. Roy. Micr. Soc., 1912, p. 388, pl. 5, figs 8, 9; pl. 6, figs. 8, 9.—PEARCEY, Trans. Roy. Soc. Edinburgh, vol. 49, 1914, p. 999.—CHAPMAN, Zool. Results *Endeavour*, vol. 3, pt. 1, 1915, p. 13, pl. 1, fig. 4.

Description.—Test subcylindrical or slightly fusiform, the exterior or apertural end more or less club shaped; wall composed of elongate sponge spicules, cemented together in various ways either side by side or more often somewhat irregularly or even interlacing, apertural end with a mass of loosely felted spicules from which a few larger spicules radiate, two or three times the diameter of the tubular portion.

Diameter of tubular portion, up to 0.35 mm.; length, up to 12–15 mm.

Distribution.—There are but few records for this species but they are very widely scattered in all the great ocean basins. It is recorded from Faroe Channel by Brady and off Buenos Aires in the *Challenger* dredgings and Heron-Allen and Earland record it from the North Sea. The only material I have had is from the Caribbean Sea, two stations and two others off our eastern Atlantic coast.

The material discovered by Earland in the North Sea is very interesting as giving much new data in regard to the structure of this species. They [1] are quoted at length in the following paragraphs:

> This species was described and figured by Brady from species dredged by the *Knight Errant* in the warmer area of the Faroe Channel, 530–542 fathoms. He described his species as tubes of tolerably even diameter rarely exceeding one-fourth inch in length and varying from one two-hundredth to one one-hundredth inch in breadth, manifestly only portions of an organism that might be continued almost indefinitely.
>
> The species is abundant in most of the deep-water dredgings made by the *Goldseeker* in the Faroe Channel and also at Station IX in the North Sea. But when dredging to the west of St. Kilda in 1910 Earland discovered the perfect organism, which we take the present opportunity of figuring.
>
> As figured by Brady the tube of *M. cylindrica* is open at both ends, but in perfect specimens the oral extremity terminates in a club-shaped head of *loosely aggregated* sponge spicules, from which a number of long spicules 0.5–0.8 mm. in length radiate in all directions. The club-shaped head is from two to three times the diameter of the tube; the tube often reaches over one-half inch in length.
>
> The spicules forming the knob are not cemented together or to the tube, but are merely felted together and are easily broken down. This no doubt explains why the test is so seldom found in a perfect condition. It is very probable that other Foraminifera may present a similar terminal appendage when living.
>
> The purpose of the club-shaped head or knob is not very apparent, but probably it serves two purposes. The aggregation of loose spicules closing the mouth of the tube will prevent the ingress of worms and other predatory animals, while the longer spicules may serve the double purpose of defensive spines and "stays" to support the radiating pseudopodia in their quest for food. As the tube grows in length the spicules are absorbed and built into the wall of the tube, other spicules being collected to serve in their place.
>
> *Marsipella cylindrica*, although a neat builder, does not show the skill and constructive ingenuity of its relative, *M. spiralis*. Sponge spicules enter largely but not entirely into its construction, being mixed indiscriminately with some sand grains, mica, etc., in varying proportions. Individual specimens vary greatly in the neatness of their construction, some showing a slight tendency toward a spiral arrangement of the fragments. We figure one fragment in which this spiral twist is strikingly maniest. The absence of the cement which characterizes *M. spiralis* proves that the fragment should be referred to *M. cylindrica* and not to *M. spiralis*. Moreover the spiral is right-handed.
>
> The question might arise whether the presence of the terminal club-shaped head in *M. cylindrica* does not necessitate the transference of the species to a separate genus. In view of the fact that the terminal portion is so loosely constructed that it can not be said to *close* the tube, we see no reason at present for the transfer of the species. We would, however, suggest that Norman's definition of his genus *Marsipella*, now quoted,[2] should be amplified by the inclusion of the words we have inserted in italics.
>
> ### Genus MARSIPELLA, n. g.
>
> *μάρσιπος* (a purse.)
>
> Test elongated, fusiform (or *cylindrical*) centrally cylindrical and drawn out to gradually attenuated extremities, open at both ends [*or closed anteriorly by a loosely aggregated knob of spicules*] monothalamous; anterior extremity much produced into

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[1] Heron-Allen and Earland, Journ.Roy.Micr.Soc.,1912,p.388,pl.5,figs.8,9; pl.6,figs.8,9.

[2] Norman, A. M., "On the genus *Haliphysemag*, with description of several forms apparently allied to it." Ann. Mag. Nat. Hist., ser. 5, vol. 1, p. 281.

a narrow contracted mouth-opening. Extraneous matter of body wall consisting for the most part of sand grains, but at the oral extremity composed almost solely of fragments of sponge spicules longitudinally arranged.

Marsipella cylindrica—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
9714	U.S.N.M.	1	D2150....	13 34 45 N.; 81 21 10 W.	382	45.75	wh. crs. s....	Rare.
9715	U.S.N.M.	1	D2204....	39 30 30 N.; 71 44 30 W.	728	39.1	br. m.......	Rare.
9363	U.S.N.M.	1	D2550....	39 44 30 N.; 70 30 45 W.	1,081	38.5	br. m.......	Rare.
9364	U.S.N.M.	1	H80......	13 56 35 N.; 63 02 00 W.	684	....	gy. m. for...	Rare.
6257	U.S.N.M.	10+	Lightning	....	650	46	....	

MARSIPELLA SPIRALIS Heron-Allen and Earland.

Plate 9, fig. 7; plate 10, figs. 6, 7.

Marsipella spiralis Heron-Allen and Earland, Journ. Roy. Micr. Soc., 1912, p. 387, pl. 5, fig. 7; pl. 6, figs. 6, 7.

The original description is as follows:

Test free, monothalamous, consisting of an undivided tube, which is built up of minute fragments of sponge spicules embedded in a light-gray cement, and arranged transversely to the long axis of the tube. The spicules are built in a single layer, and have a distinctly spiral arrangement when the specimen is examined either as an opaque object or in a balsam mount. Viewed as an opaque object under a 12 mm. objective, *Marsipella spiralis* looks exactly like a piece of white string.

The protoplasm is dark brown in color and appears to run the entire length of the tube.

Marsipella spiralis is one of the most interesting species we have met. The use of sponge spicules, either entire or fragmentary, as building material is of frequent occurrence in the Foraminifera, but we know of no other species, except its near relative, *Marsipella cylindrica* (Brady) and *Technitella legumen* (Norman), in which sponge spicules are employed in a manner or for purposes which in any organism of higher development than the Foraminifera, would presuppose "intelligence" on the part of the builder.

The sponge spicules employed by *Marsipella spiralis* are almost without exception fragments. They are selected of practically uniform length, 0.06–0.1 mm., and arranged at angles between 30° and 45° around the tube. The spiral is always left-handed. It is obvious that the strength of the tube is greatly increased by the spiral arrangement of the spicules; indeed, *Marsipella* has made the same great discovery as the man who first observed that a twisted string was stronger than an untwisted wisp of fibers.

Marsipella spiralis is confined to a limited area, so far as our observations go. It occurs rarely in a rich foraminiferous mud dredged by the *Goldseeker* in the North Sea (Haul 145, Station IXB, depth 330 meters), and an occasional specimen is to be found at adjacent stations, especially Station IX (61° 34′ N.; 2° 4′ E., 390 meters). No specimen has yet been found showing definite initial or final portions of the tube, all being more or less fragmentary; but the fact that nearly all the fragments were living when dredged, as was proved by the presence of protoplasm in the tube, seems to show that the tube may grow indefinitely, and that injuries to the extremity of the tube do not effect the life of the animal. The tube is doubtless flexible when living, like *Bathysiphon filiformis* (Sars). The fragments vary from 1 to 4 mm. in length. The average external diameter of the tube is 0.08 mm.

MARSIPELLA ECHINATA (de Folin).

Bathysiphon echinatus de Folin, Act. Soc. Linn. Bordeaux, vol. 40 (ser. 4, vol. 10), 1886, p. 278, pl. 6, fig. 3.
Marsipella echinata Rhumbler, Arch. Prot., vol. 3, 1903, p. 266, fig. 111 (in text).

Description.—Test free, irregularly cylindrical, open at one end; wall composed largely of elongate sponge spicules on the exterior, sand grains beneath, spicules placed crosswise and outer surface rough bristly, the spicules pointing at an acute angle backward, aperture formed by the open end of the tube.

Length, 9–10 mm.; breadth, 0.5–0.6 mm.

Distribution.—Described by de Folin from the Gulf of Gascony.

This seems to be a *Marsipella* rather than *Bathysiphon* if the spicular condition of the exterior is taken into consideration. It might have been also a very spiculiferous form of *Saccorhiza.* Nothing is known of it except de Folin's description and figure.

Genus BATHYSIPHON G. O. Sars, 1871.

Bathysiphon (M. Sars in MS.) (type, *B. filiformis* G. O. Sars) G. O. Sars, Förh. Vid. Selsk. Christiania, 1871 (1872), p. 251.—Norman, Rep. Brit. Ass. (Swansea), 1880, pp. 389–390.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 248.—de Folin, Act. Soc. Linn, Bordeaux, vol. 40, 1886. p. 273.—Rhumbler, Arch. Prot., vol. 3, 1903, p. 269.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 30.

Description.—Test free, cylindrical, often tapering slightly, straight or more often somewhat curved, in some species externally constricted but not correspondingly constricted internally; wall composed of a base of broken sponge spicules cemented and overlaid with a fine grained apparently siliceous cement, aperture at the ends of the tube.

There are several species of this genus known from the Atlantic, mostly from the cooler waters.

BATHYSIPHON FILIFORMIS G. O. Sars.

Plate 11, figs. 4, 5.

Bathysiphon filiformis (M. Sars MS.) G. O. Sars, Förh. Vid. Selsk. Christiania, 1871 (1872), p. 251.—Norman, Rep. Brit. Ass. (Swansea), 1880, p. 389.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 248, pl. 26, figs. 15–20.—Goës, Köngl. Svensk. Vet. Akad. Handl., vol. 25, No. 9, 1894, p. 16, pl. 3, figs. 39–41.—de Folin, Act. Soc. Linn. Bordeaux, vol. 40, 1886, p. 279, pl. 6, figs. 4*a–e*.—Chapman, Proc. Zool. Soc. London, 1895, p. 12.—Goës, Bull. Mus. Comp. Zoöl., vol. 29, 1896, p. 23, pl. 1, figs. 11, 12.—Rhumbler, Arch. Prot., vol. 3, 1903, p. 270, fig. 116 (in text).—Schubert, Jahrb. geol. Reichsanst, vol. 53, 1904, p. 412, pl. 19, fig. 13.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 31, figs. 17–21 (in text).—Pearcey, Trans. Roy. Soc. Edinburgh, vol. 49, 1914, p. 999.

Description.—Test free, cylindrical, of nearly uniform diameter throughout, slightly curved, chamber tubular, of uniform diameter, wall composed of felted and slightly cemented sponge spicules and fine amorphous material in varying quantitied, rather soft, almost friable, surface with a film of dull black or light brown; in worn specimens white.

Length, up to 50 mm. or more; diameter, up to 4 mm.

Distribution.—The recorded distribution of this species is practically world-wide. On the European side of the Atlantic it was described from Hardanger Fjord, Norway (M. Sars, G. O. Sars, Norman), and is recorded from the Bay of Biscay (Norman, de Folin) as well as from the Mediterranean and off the Azores. From the American side it is unrecorded. An examination of the *Albatross* material gives specimens from numerous stations especially massed between Cape Hatteras and the latitude of Cape Cod with a single station off Nova Scotia. The depths range from 82 to 1,859 fathoms, only two stations, however, being in depths greater than 1,000 fathoms, and the bottom temperatures range from 38.6° to 40.6° with one at 45° F.

From nearly all of these the material where unworn has a dark coating over the whitish interior and is without constricted or jointed areas. At one station material was found like the typical European material, white and distinctly jointed. In comparison with *B. rufus* it is a species of colder waters as far as the data from the *Albatross* material shows. *B. filiformis* does not occur in the material south of Cape Hatteras, while *B. rufus* is found in the Gulf of Mexico and Caribbean Sea.

Pearcey speaks of material obtained from the Antarctic having a considerable number of mineral particles built into the walls, due, as he thinks, to the nature of the glacial deposit with which the specimens occur.

Bathysiphon filiformis—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
9607	U.S.N.M.	2	D2046....	40 02 49 N.; 68 49 00 W.	407	40	bu. m.......	Few.
9608	U.S.N.M.	2	D2048....	40 02 00 N.; 68 50 30 W.	547	39	crs. m. g....	Few.
9609	U.S.N.M.	1	D2110....	35 12 10 N.; 74 57 15 W.	516	40	bu. m.......	Rare.
9610	U.S.N.M.	2	D2111....	39 09 50 N.; 74 57 40 W.	938	....	gn. m.......	Rare.
9611	U.S.N.M.	10	D2172....	38 01 15 N.; 73 44 00 W.	568	39	gn. m.......	Common.
9612	U.S.N.M.	1	D2187....	39 49 30 N.; 71 10 00 W.	420	39.7	gn. m. s.....	Few.
9613	U.S.N.M.	10+	D2202....	39 38 00 N.; 71 39 45 W.	515	39.1	gn. m.......	Common.
9614	U.S N.M.	1	D2203....	39 34 15 N.; 71 41 15 W.	705	38.9	gn. m. s.....	Rare.
9615	U.S.N.M.	1	D2212....	39 50 30 N.; 70 30 45 W.	428	40	gn. m.......	Rare.
9616	U.S.N.M.	10+	D2213....	39 58 30 N.; 70 30 00 W.	384	39.5	gn. m.......	Few.
9264	U.S.N.M.	1	D2234....	39 09 00 N.; 72 03 15 W.	810	38.6	gn. m.......	Few.
9265	U.S.N.M.	5	D2237....	39 12 17 N.; 72 09 30 W.	520	39.5	gn. m.......	Few.
9617	U.S.N.M.	1	D2263....	37 08 00 N.; 74 33 00 W.	430	....	gn. m.......	Rare.
9266	U.S.N.M.	10+	D2504....	44 23 00 N.; 61 22 45 W.	82	40.6	bk. m. g.....	Common.
9267	U.S.N.M.	3	D2552....	39 47 04 N.; 70 35 00 W.	721	39.6	gy. oz.......	Few.
9268	U.S.N.M.	1	D2713....	38 20 00 N.; 70 08 30 W.	1,859	....	br. oz.......	Rare.
9269	U.S.N.M.	10+	D2729....	36 36 00 N.; 74 32 00 W.	679	....	dk. gn. m...	Common.
9270	U.S.N.M.	10+	D2731....	36 45 00 N.; 74 28 00 W.	781	....	gy. oz.......	Common.

BATHYSIPHON CAPBRITONENSIS de Folin.

Bathysiphon capbritonensis DE FOLIN, Act. Soc. Linn. Bordeaux, vol. 40 (ser. 4, vol. 10), 1886, p. 274, pl. 5, figs. 1*a*–*e*.—RHUMBLER, Arch. Prot., vol. 3, 1903, p. 269, fig. 115 (in text).

Description.—Test free, large, cylindrical, slightly tapering and slightly curved, closed at one end; composed of siliceous sand and sponge spicules with a slight amount of cement; exterior smooth except for irregular annular rings slightly raised, wall white except the exterior which is light brown; aperture formed by the open end of the tube.

Length, 43 mm.; breadth, 2 mm.

Distribution.—De Folin obtained the species from material dredged off Cape Breton, Gulf of Gascony; from off Corsica in 727 meters, and from the coast of Morocco in 370 meters.

BATHYSIPHON STRICTUS de Folin.

Bathysiphon strictus DE FOLIN, Act. Soc. Linn. Bordeaux, vol. 40 (ser. 4, vol. 10), 1886, p. 285, pl. 8, figs. 10*a*–*b*.—RHUMBLER, Arch. Prot., vol. 3, 1903, p. 271, fig. 119 (in text).

Description.—Test free, elongate cylindrical, not tapering, slightly curved, wall composed in large part of long acerose spicules with more or less white amorphous material, surface slightly roughened, the spicules placed longitudinally or slightly oblique; when wet, the test is translucent and flexible, white; aperture at the end of the tube.

Length, 10–15 mm.; breadth, 0.2–0.4 mm.

Distribution.—Type-specimens were described by de Folin from the Gulf of Gascony, depth not given.

BATHYSIPHON RUFUS de Folin.

Bathysiphon rufum DE FOLIN, Act. Soc. Linn. Bordeaux, vol. 40, (ser. 4, vol. 10), 1886, p. 283, pl. 6, figs. 8*a*–*c*.—GOËS, Bull. Mus. Comp. Zoöl., vol. 29, 1896, p. 23, pl. 1, fig. 10.—FLINT, Rep. U. S. Nat. Mus., 1897 (1899), p. 267, pl. 7.—RHUMBLER, Arch. Prot., vol. 3, 1903, p. 270, fig. 118 (in text).—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 32, fig. 22 (in text).

Description.—Test free, elongate, tapering, slightly curved, exteriorly somewhat irregularly constricted, smooth and polished, wall comparatively thick, composed of sponge spicules, usually fragmentary, with a very hard siliceous cement in great preponderance; color reddish or yellowish brown; aperture circular at the end of the test.

Length, up to 12 mm.; diameter of larger end, about 0.5 mm.

Distribution.—De Folin described this species from the Gulf of Gascony, and that seems to be the only record for that side of the Atlantic. On the western side it has been recorded by Goës from the Caribbean Sea, 1,345 fathoms, and by Flint from the Gulf of Mexico, 730 fathoms, and from off Bahia, Brazil, 1,019 fathoms. In the, *Albatross* dredgings it has occurred at numerous stations, all, however, south of the latitude of Cape Cod. It occurs at scattered stations from latitude 40° N. southward off our coast at several stations in the Gulf of Mexico and Caribbean Sea, and I have had material from D2761 off Bahia, Brazil. The stations range in depth from 93 to 2,069 fathoms and bottom temperatures from 37.7° to 42.3° F.

Although these bottom temperatures are not high, the distribution of this species is much more tropical in its records than that of *B. filiformis*, which apparently does not get into the Gulf of Mexico or the Caribbean Sea.

Bathysiphon rufus—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°*F.*		
9618	U.S.N.M.	2	D2018....	37 12 22 N.; 74 20 04 W.	788	39	bu. m.......	Rare.
9619	U.S.N.M.	1	D2035....	39 26 16 N.; 70 02 37 W.	1,362	....	glob. oz......	Rare.
9620	U.S.N.M.	1	D2043....	39 49 00 N.; 68 28 30 W.	1,467	38.5	glob. oz......	Few.
9621	U.S.N.M.	1	D2105....	37 50 00 N.; 73 03 50 W.	1,395	41	glob. oz......	Few.
9622	U.S.N.M.	1	D2110....	35 12 10 N.; 74 57 15 W.	516	40	bu. m.......	Rare.
9623	U.S.N.M.	2	D2115....	35 49 30 N.; 74 34 45 W.	843	39	m. fne. s.....	Rare.
9624	U.S.N.M.	2	D2140....	17 36 10 N.; 76 46 05 W.	966	39.7	s............	Rare.
9625	U.S.N.M.	1	D2203....	39 34 15 N.; 71 41 15 W.	705	38.9	gn. m. s......	Rare.
9271	U.S.N.M.	1	D2229....	37 38 40 N.; 73 16 30 W.	1,423	37.7	glob. oz......	Rare.
9626	U.S.N.M.	1	D2392....	28 47 30 N.; 87 27 00 W.	724	40.7	br. gy. m....	Rare.
9272	U.S.N.M.	2	D2505....	44 23 30 N . 61 44 15 W.	93	42.3	dk. br. m....	Rare.
9273	U.S.N.M.	2	D2550....	39 44 30 N.; 70 30 45 W.	1,081	38.5	br. m.......	Few.
9274	U.S.N.M.	2	D2562....	39 15 30 N.; 71 25 00 W.	1,434	37.3	gy. oz.......	Rare.
9627	U.S.N.M.	8	D2678....	32 40 00 N.; 76 40 30 W.	731	38.7	lt. gy. oz.....	Few.
9628	U.S.N.M.	4	D2679....	32 40 00 N.; 76 40 30 W.	782	38.6	lt. gy. oz.....	Few.
9629	U.S.N.M.	1	D2761....	15 39 00 N.; 38 32 54 W.	818	39	pter. oz......	Rare.
9275	U.S.N.M.	2	H67......	16 13 45 N.; 64 22 30 W.	2,069	....	co. s. for. sh..	Rare.
9276	U.S.N.M.	1	H88......	12 29 00 N.; 62 38 30 W.	1,630	....	m. bk. sp. for.	Rare.

BATHYSIPHON MINUTA Pearcey.

Bathysiphon minuta PEARCEY, Millport Marine Biol. Stat. Comm., vol. 1, 1900, p. 39, pl. 2, figs. 1-5.—HERON-ALLEN and EARLAND, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 38.

The original description was as follows:

> Test a long, thin, very narrow, gradually tapering tube, with finely arenaceous walls consisting of fine mineral particles loosely cemented to a chitinous lining, when dried or mounted in balsam, the walls of the tube collapse at intervals. Color light gray to white.

Distribution.—The author of this species described it from the English coast and it has not been recorded elsewhere.

BATHYSIPHON ARGENTEUS Heron-Allen and Earland.

Plate 12, figs. 1-3.

Bathysiphon argenteus HERON-ALLEN and EARLAND, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 38, pl. 3, figs. 1-3; Trans. Linn. Soc. London, vol. 11, pt. 13, Mar. 1916, p. 218.

The original description is as follows:

> Test free, minute, tubular, of a silvery lustre when viewed as an opaque object, flexible when living, rather brittle in the dry condition. Consisting of very thin chitinous tube of nearly even diameter throughout, but sometimes exhibiting a slight increase in diameter with growth. The tube is open at bottom extremities

which are somewhat constricted and rounded. Viewed as a transparent object (in balsam) under a high magnification, the wall of the tube is seen to contain large numbers of extremely minute rod-shaped bodies, which are, as a rule, laid more or less at right angles to the long axis of the tube, the characteristic metallic luster of the tube when viewed as an opaque object is apparently due to the diffraction of the rays of light falling on these parallel layers of spicules. The tube is not affected by boiling in nitric acid for a few seconds, so the spicules can not be calcareous.

Length of tube, up to 2mm.; external diameter, 0.03 to 0.05 mm.; thickness of tube wall, 0.002 to 0.004 mm.; spicules vary from 0.001 to 0.006 mm. in length.

The authors described this species from Killary Bay, on the west coast of Ireland. They record it also from 10 to 200 fathoms around the coast of Scotland and in the North Sea across to the coast of Norway.

Although searched for, I have been unable to find this species in material from this side of the Atlantic.

Genus RHIZAMMINA H. B. Brady, 1879.

Rhizammina H. B. Brady (type, *R. algaeformis* H. B. Brady), Quart. Journ. Micr. Sci., vol. 19, 1879, p. 39.—Bütschli in Bronn, Klassen und Ordnungen des Thierreichs, vol. 1, 1880, p. 195.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 274.—Rhumbler, Arch. Prot., vol 3, 1903, p. 252.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 33.

Marsipella (part) Eimer and Fickert, Zeitschr. Wiss. Zool., vol. 65, 1899, p. 668.

Description.—Test free, consisting of a simple or dichotomously branching, flexible tube, wall largely chitinous, bearing various foreign bodies attached to the exterior.

Two species only are known and both occur in small numbers as far as the *Albatross* material has shown in the Atlantic, but they are widely distributed.

RHIZAMMINA ALGAEFORMIS H. B. Brady.

Plate 11, figs. 2, 3.

Rhizammina algaeformis H. B. Brady, Quart. Journ. Micr. Sci., vol. 19, 1879, p. 39, pl. 4, figs. 16, 17; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 274, pl. 28, figs. 1-11.—Goës, Bull. Mus. Comp. Zoöl., vol. 29, 1896, p. 20.—Flint, Rep. U. S. Nat. Mus., 1897 (1899), p. 272, pl. 15, fig. 1.—Rhumbler, Arch. Prot., vol. 3, 1903, p. 252, fig. 92 (in text).—Cushman, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 33, fig. 23 (in text).—Pearcey, Trans. Roy. Soc. Edinburgh, vol. 49, 1914, p. 999.—Heron-Allen and Earland, Trans. Zool. Soc., London, vol. 20, 1915, p. 611; Trans. Linn. Soc., London, vol. 11, pt. 13, 1916, p. 221.

Description.—Test free, consisting of a dichotomously branching flexible tube, forming irregular masses of indefinite size; wall thin, largely chitinous but with various sorts of foreign matter attached to the exterior, either sand or other foraminiferal tests according to the character of the bottom outer surface when free from foreign material somewhat roughened, color of the chitinous tubes brown or gray.

Diameter of tube, 0.126-0.315 mm.

Distribution.—Brady gives three Atlantic stations for this delicate species, *Porcupine* station 37, 2,435 fathoms, and "two other localities in the North Atlantic, at depths of 630 and 1,125 fathoms, respectively." Heron-Allen and Earland record it from two stations off the west of Scotland, making the first record from British waters and mention the fact that it is "common in deep water off the Irish and west Scottish coasts." Pearcey records it from diatom ooze in the Antarctic 2,103 and 2,180 fathoms. Heron-Allen and Earland record it from the Kerimba Archipelago off the southeastern coast of Africa "attached to an oyster shell in shallow water." The majority of them were simple tubes, the remainder furcating irregularly. As the original description says "free" and as it is a dichotomously branching form from cold waters it is suggested that the Kerimba attached material from shallow, warm tropical waters may be another thing.

Brady's material showed a very large per cent of silica making up the test in alcoholic or dried material. The amount of chitinous material is sufficient, however, to make the test very flexible. On drying specimens are very easily broken and in dried dredged material only small fragments are usually present. Such fragmentary specimens have occurred at a few *Albatross* stations in the western Atlantic, four southward of Georges Bank and one off the Central American coast in the Caribbean Sea. One station is in 382 fathoms, the others from 1,582 to 1,917 fathoms.

Rhizammina algaeformis—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
9836	U.S.N.M.	2	D2097....	37 56 20 N.; 70 51 30 W.	1,917	....	glob. oz.....	Rare.
9837	U.S.N.M.	1	D2150....	13 34 45 N.; 81 21 10 W.	382	45.75	wh. crs. s...	Rare.
9420	U.S.N.M.	1	D2228....	37 25 00 N.; 73 06 00 W.	1,582	36.8	br. m.......	Rare.
9421	U.S.N.M.	1	D2713....	38 20 00 N.; 70 08 30 W.	1,859	....	br. oz.......	Rare.
9422	U.S.N.M.	1	D2716....	38 29 30 N.; 70 57 00 W.	1,631	....	br. oz. for...	Rare.

RHIZAMMINA INDIVISA H. B. Brady.

Plate 12, figs. 7–10.

Rhizammina indivisa H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 277, pl. 29, figs. 5–7.—Egger, Abh. Bay. Akad. Wiss. München, vol. 18, 1893, p. 256, pl. 4, fig. 17.—Chapman, Proc. Zool. Soc. London, 1895, p. 14.—Goës, Bull. Mus. Comp. Zoöl., vol. 29, 1896, p. 20.—Flint, Rep. U. S. Nat. Mus., 1897 (1899), p. 272, pl. 15, fig. 2.—Rhumbler, Arch. Prot., vol. 3, 1903, p. 252, fig. 91 (in text).—Cushman, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 34, fig. 24 (in text).—Pearcey, Trans. Roy. Soc. Edinburgh, vol. 49, 1914, p. 999.

Marsipella indivisa Eimer and Fickert, Zeitschr. Wiss. Zool., vol. 65, 1899, p. 668.

Description.—Test free, cylindrical, somewhat flexible, often tapering near the ends; wall composed of chitinous material, thin, with a variable amount of sand grains or more often other foraminiferal tests attached to the exterior; open ends of the tube serving as the apertures.

Length, up to 10 mm.; diameter, 0.25–0.40 mm.

Distribution.—Brady recorded the species from the Faroe Channel in 540 fathoms; it also occurs off the Cape Verde Islands (Egger); Gulf of Mexico, 211 to 1,345 fathoms (Goës); from four *Albatross* stations D2234, southward of Long Island; D2355, Strait of Yucatan; D2380, Gulf of Mexico; and D2760, coast of Brazil ranging from 400 to 1,400 fathoms (Flint).

In the *Albatross* material that I have examined it has occurred at numerous stations from off Nova Scotia to the Gulf of Mexico and the Caribbean Sea, depths ranging from 788 to 2,045 fathoms with two shallower stations at 382 and 82 fathoms. Bottom temperatures for the most part range from 36.8° to 40.6° F.

When the outer attached foraminiferal tests are rubbed away in dry material a chitinous test is left with a certain amount of fine grayish material covering the surface except where the larger particles such as other foraminiferal tests were attached. At these places there are apparently at first glance round openings, but close observation will show that there is here a very thin light-brown chitinous layer nearly transparent. The finer material was filled in after the larger particles for there is no coating below them. One of Brady's figured specimens, *Challenger* Report (pl. 29, fig. 6), shows this apparently perforated condition of the test. When all the larger particles are rubbed away a peculiar looking test is the result.

Rhizammina indivisa—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°*F.*		
9838	U.S.N.M.	1	D2035....	39 26 16 N.; 70 02 37 W.	1,362	....	glob. oz.....	Rare.
9839	U.S.N.M.	1	D2097....	37 56 20 N.; 70 57 30 W.	1,917	....	glob. oz.....	Rare.
9840	U.S.N.M.	4	D2150....	13 34 45 N.; 81 21 10 W.	382	45.75	wh. crs. s....	Common.
9841	U.S.N.M.	10+	D2218....	37 12 22 N.; 74 20 04 W.	788	39	gy. m.......	Common.
9423	U.S.N.M.	4	D2226....	37 00 00 N.; 71 54 00 W.	2,045	36.8	glob. oz.....	Few.
9842	U.S.N.M.	1	D2383....	28 32 00 N.; 88 06 00 W.	1,181	39.8	br. gn. m....	Few.
9424	U.S.N.M.	1	D2504....	44 23 00 N.; 61 22 45 W.	82	40.6	pk. m. g.....	Few.
9425	U.S.N.M.	1	D2564....	39 22 00 N.; 71 23 30 W.	1,390	37.3	gy. oz.......	Few.
9426	U.S.N.M.	2	D2713....	38 20 00 N.; 70 08 30 W.	1,859	....	br. oz.......	Few.
9427	U.S.N.M.	1	D2716....	38 29 30 N.; 70 57 00 W.	1,631	....	br. oz. for...	Few.

Subfamily 2. SACCAMMININAE.

Genus PSAMMOSPHAERA F. E. Schulze, 1875.

Psammosphaera F. E. Schulze (type, *P. fusca* F. E. Schulze), II Jahr. Comm. Wiss. Unt. deutsch. Meer in Kiel, 1875, p. 113.—Bütschli, in Bronn, Klassen und Ordnungen Thierreichs, vol. 1, 1880, p. 202.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 249.—Flint, Rep. U. S. Nat. Mus., 1897 (1899), p. 267.—Eimer and Fickert, Zeitschr. Wiss. Zool., vol. 65, 1899, p. 598.—Rhumbler, Arch. Prot., vol. 3, 1903, p. 241.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 35.

Saccammina (part) Rhumbler, Zeitschr. Wiss. Zool., vol. 57, 1894, p. 462; Nachr. Ges. Wiss. Göttingen, 1895, pp. 81, 82.

Description.—Test free or attached, single chambered, usually spherical, no definite aperture, the pseudopodia making their way out through the interstitial openings between the elements of the test; wall of sand grains, mica flakes, sponge spicules, or other foraminiferal tests firmly cemented.

The selective power shown by the various species of this genus are of great interest. *P. fusca* using sand grains, *P. bowmanni* making its test of mica flakes, *P. rustica* of sponge spicules, and *P. testacea* using other foraminiferal tests to construct its own. The selecting by a single-celled organism is all the more remarkable.

PSAMMOSPHAERA FUSCA F. E. Schulze.

Plate 13, figs. 1–6; plate 14, figs. 1–3.

Psammosphaera fusca F. E. Schulze, II Jahr. Comm. Wiss. Unt. deutsch. Meer in Kiel, 1875, p. 113, pl. 2, figs. 8*a*–*f*.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 249, pl. 18, figs. 1, 5–8 (not 2–4).—H. B. Brady, Parker, and Jones, Trans. Zool. Soc., vol. 12, 1888, p. 217.—Goës, Köngl. Svensk. Vet. Akad. Handl., vol. 25, No. 9, 1894, p. 14, pl. 3, fig. 19.—Chapman, Proc. Zool. Soc. London, 1895, p. 13.—Flint, Rep. U. S. Nat. Mus., 1897 (1899), p. 268, pl. 8, fig. 1.—Millett, Journ. Roy. Micr. Soc., 1899, p. 251.—Rhumbler, Arch. Prot., vol. 3, 1903, p. 242, fig. 75 (in text).—Sidebottom, Mem. and Proc. Manchester Lit. and Philos. Soc., vol. 49, No. 5, 1905, p. 1, pl. 1, fig. 1.—Heron-Allen and Earland, Journ. Quekett Micr. Club, ser. 2, vol. 10, 1909, pl. 33, fig. 3.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 36, figs. 25–28 (in text).—Awerinzew, Mem. Acad. Imp. Sci. St. Petersburg, ser. 8, vol. 29, No. 3, 1911, p. 7.—Heron-Allen and Earland, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 40; Journ. Roy. Micr. Soc., 1913, p. 16, pl. 2, figs. 3–6, 10–16.—Pearcey, Trans. Roy. Soc. Edinburgh, vol. 49, 1914, p. 1000.—Heron-Allen and Earland, Trans. Zool. Soc., vol. 20, 1915, p. 609; Trans. Linn. Soc. London, vol. 11, 1916, p. 219.

Description.—Test free in larger specimens or attached to pebbles or other larger material, generally subspherical, wall single chambered, of a single layer of rather coarse sand grains, exterior rough, interior more smoothly finished, cement gray or yellowish brown; no definite apertures.

Diameter, up to 4 mm.

Distribution.—From the records this species is very widely distributed; usually, it seems, in cooler waters, although Heron-Allen and Earland record it from the Kerimba Archipelago in shallow warm waters. The type station is Hougesund, Norway, 120 fathoms, and it is known from various stations about the British Isles and North Sea. On the western side it is recorded off Havana, Cuba, by Flint, and off the Carolina coast. In the *Albatross* and other material it has occurred at numerous stations from Nova Scotia to Cape Hatteras with peculiar black, free specimens off the Carolina coast as noted by Flint from the same material.

In shallow water both on our coasts and the European side it tends to an attached form, while in deeper water it is more often free, Heron-Allen and Earland[1] say that the "protoplasm extrudes through the fine pores of the cement and functions of digestion are carried on outside of the test." If this is true, what happens in such forms as this and *Crithionina*, where there is no large aperture when the nuclear divisions occur and the macrospheric young or zoospores of the microspheric form are produced? Are these produced outside the test or does the test resorb a portion of its cemented wall and break down? Some such occurrence must take place at this time.

Psammosphaera fusca—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		° F.		
9769	U.S.N.M.	1	D2046....	40 02 49 N.; 68 49 00 W.	407	40	bu. m.......	Rare.
9914	U.S.N.M.	....	D2074....	41 43 00 N.; 65 21 50 W.	1,309	40	m. & st......	Rare.
9770	U.S.N.M.	1	D2093....	39 42 50 N.; 71 01 20 W.	1,000	39	s. m.........	Rare.
9771	U.S.N.M.	1	D2115....	35 49 30 N.; 74 34 45 W.	843	39	m. fne. s.....	Rare.
9772	U.S.N.M.	1	D2171....	37 59 30 N.; 73 48 40 W.	444	39.5	gn. m.......	Rare.
9773	U.S.N.M.	3	D2174....	38 15 00 N.; 72 03 00 W.	1,594	....	gy. m.......	Few.
9774	U.S.N.M.	3	D2189....	39 49 30 N.; 70 26 00 W.	600	39.7	gn. m. s.....	Few.
9775	U.S.N.M.	2	D2203....	39 34 15 N.; 71 41 15 W.	705	38.9	gn. m. s.....	Few.
9776	U.S.N.M.	1	D2217....	39 47 20 N.; 69 34 15 W.	924	38.1	gy. m.......	Rare.
9403	U.S.N.M.	1	D2231....	38 29 00 N.; 73 09 00 W.	965	36.8	gy. oz.......	Rare.
9780	U.S.N.M.	10+	D2243....	40 10 15 N.; 70 26 00 W.	63	52.4	gn. m.......	Common.
9404	U.S.N.M.	1	D2247....	40 03 00 N.; 69 57 00 W.	78	51.9	gy. m. s.....	Rare.
9405	U.S.N.M.	10+	D2264....	37 07 50 N.; 74 34 20 W.	167	46.8	gy. s........	Common.
9406	U.S.N.M.	10+	D2314....	32 43 00 N.; 77 51 00 W.	159	47.4	crs. s. bk. sp. brk. sh.	Common.
9407	U.S.N.M.	1	D2531....	40 42 00 N.; 60 33 00 W.	853	34.4	gy. m.......	Rare.
9408	U.S.N.M.	1	D2547....	39 54 30 N.; 70 20 00 W.	390	39.6	gn. m.......	Rare.
9409	U.S.N.M.	2	D2552....	39 47 07 N.; 70 35 00 W.	721	39.6	gy. oz.......	Rare.
9410	U.S.N.M.	10	D2572....	40 29 00 N.; 66 04 00 W.	1,769	37.8	gy. oz.......	Few.
9411	U.S.N.M.	1	D2581....	39 43 00 N.; 71 34 00 W.	394	....	gn. m.......	Rare.
9412	U.S.N.M.	3	D2582....	39 38 00 N.; 70 22 00 W.	1,004	....	gn. m. s.....	Few.
9413	U.S.N.M.	2	D2697....	32 40 00 N.; 76 40 30 W.	782	38.6	lt. gy. oz....	Few.
9414	U.S.N.M.	1	D2706....	41 28 30 N.; 65 35 30 W.	1,188	....	gy. oz. for...	Rare.
9915	U.S.N.M.	....	Speedwell 75	Sandwich Point off Halifax Harbor.	....	....	....	Rare.
9922	U.S.N.M.	....	219	42 30 00 N.; 70 33 00 W.	32	55.5	....	Rare.
9415	U.S.N.M.	2	Goldseeker	61 03 00 N.; 2 20 00 W.	1,418m	....	....	Rare.

PSAMMOSPHAERA PARVA Flint.

Plate 12, figs. 4–6.

Psammosphaera parva FLINT, Rep. U. S. Nat. Mus., 1897 (1899), p. 268, pl. 9, fig. 1.—RHUMBLER, Arch. Prot., vol. 3, 1903, p. 242, fig. 77 (in text).—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 36, figs. 29, 30 (in text).

Psammosphaera fusca (part) H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 250, pl. 18, figs. 2–4 (not 1, 5–8).—HERON-ALLEN and EARLAND, Journ. Quekett Micr. Club, ser. 2, vol. 10, 1909, pl. 35, fig. 13.

Psammosphaera fusca SCHULZE, var. *parva* HERON-ALLEN and EARLAND, Journ. Roy. Micr. Soc., 1913, p. 17, pl. 2, figs. 7, 8.

Description.—Test free, usually with a single long acerose sponge spicule incorporated in the test, which is small, rounded, single chambered; wall of sand grains firmly cemented by a reddish-brown cement; aperture indefinite, probably provided for by fine interstitial openings between the sand grains.

Diameter, usually between 0.30 and 0.75 mm.

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[1] Journ. Roy. Micr. Soc., 1913, p. 16, etc.

Distribution.—This species has not been distinguished often from the related species *P. fusca.* Flint described it from the coast of Brazil, *Albatross* D2760 in 1,019 fathoms. Heron-Allen and Earland record it off the Hebrides.

It is evidently a distinct species from *P. fusca* and the habit of building a large sponge spicule into the test appears distinctive. The following notes from Heron-Allen and Earland [1] are of interest in this connection:

> In * * * *parva*, the test, which is always of comparatively small dimensions, is nearly symmetrical and spherical, composed of small sand grains rigidly cemented together, without definite aperture of any kind and very often around a sponge spicule which projects on opposite sides of the sphere, sometimes to a length many times exceeding the total diameter of the test. * * * This spicular form is of very infrequent occurrence, and is in our experience extremely local. [In their paper, they have *P. fusca* from 85 out of 145 stations examined and spiculiferous var. *parva* occurs at but two stations, and at only one of these was more than an occasional specimen found.] The one exception is haul 228, taken off St. Kilda west of the Hebrides in 1,600 meters, the sea bottom being *Globigerina* ooze. Here the spiculiferous variety *parva* is of quite frequent occurrence. In view of such facts, and of the added fact that two species of *Psammosphaera*, which we have described from *Goldseeker's* dredgings [*P. bowmanni*, mica plates, and *P. rustica*, sponge spicules] display marked selective powers. we can not but arrive at the conclusions that the presence of this central spicule in var. *parva* is not fortuitous, but that the animal deliberately chooses the spicule as a main constituent of its "house," and constructs its abode round the spicule in order to obtain the increased support afforded by its projections in supporting itself upon the surface layers of the bottom ooze.

I have had specimens from the following list of stations:

Psammosphaera parva—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F		
9778	U.S.N.M.	1	D2381	28 05 00 N.; 87 56 15 W	1,330	....	lt. br. m.....	Rare.
9416	U.S.N.M.	2	D2393	28 43 00 N.; 87 14 30 W.	525	41.1	lt. gy. m....	Rare.
9777	U.S.N.M.	6	D2679	32 40 00 N.; 76 40 30 W.	782	38.6	lt. gy. oz....	Few.
			D2760	12 07 00 S.; 37 17 00 W.	1,019	39.5	br. co.......	Few.
9779	U.S.N.M.	1	D2761	15 39 00 S.; 38 32 54 W.	818	39	pter. oz.....	Rare.
9417	U.S.N M.	1	H48	17 42 00 N.; 65 12 40 W.	978	....	co. oz. for...	Rare.

PSAMMOSPHAERA BOWMANNI Heron-Allen and Earland.

Plate 9, figs. 5, 6; plate 10, fig. 5.

Psammosphaera bowmanni Heron-Allen and Earland, Journ. Roy. Micr. Soc., 1912, p. 385, pl. 5, figs. 5, 6; pl. 6, fig. 5; Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 39; Trans. Linn. Soc. London, vol. 11, pt. 13, 1916, p. 219.

The following is from the original description:

Test free, monothalamous, consisting of a more or less irregularly polyhedral chamber, constructed of small flakes of mica cemented together at the edges by a light-gray mudlike cement. No definite oval aperture. There is often a small opening where two or three of the mica flakes meet at an acute angle, due to absence of cement at the point of juncture. This opening, however, appears to be merely accidental and is not present in the majority of specimens. The cement used is not ferruginous, but appears to consist of very fine homogeneous mud. It is absorbent and very easily broken up, and is no doubt very porous, thus serving for the passage of the protoplasmic extensions.

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[1] Journ. Roy. Micr. Soc., 1913, p. 17.

The specimens vary considerably in size and shape, but the most usual form has a length about twice its breadth.

Average length, 0.4–0.6 mm.; breadth, 0.25–0.35 mm.

Distribution.—This species was originally described from the deep water in the gully off Burghead, in the Moray Firth, *Goldseeker*, haul 73, 35 fathoms, and haul 7791, in 55 meters. From the Clare Island Survey the authors record single specimens from four stations and two from a fifth, depths varying from 3 to 15 fathoms. The further record is from two stations off the west of Scotland, each in 30 fathoms, and a single specimen at each station.

PSAMMOSPHAERA RUSTICA Heron-Allen and Earland.

Plate 9, figs. 3, 4; plate 10, figs. 2–4.

Psammosphaera rustica HERON-ALLEN and EARLAND, Journ. Roy. Micr. Soc., 1912, p. 383, pl. 5, figs. 3, 4; pl. 6, figs. 2–4.

The original description is as follows:

> Test free, monothalamous, consisting of a polyhedral chamber constructed almost entirely of sponge spicules, whole or fragmentary, neatly cemented together in a single layer, and with a minimum quantity of ferruginous cement. The cement is confined to the actual line of attachment between the edges of the spicules, and does not extend over the outer or inner wall of the test. There is no definite oral aperture. Average size, 0.3–0.5 mm. (chambers only).
>
> Hardly any two specimens exhibit an identical shape or external appearance. This diversity is due to the methods of construction and material employed. Apparent method of construction is to select a number of long slender spicules often 2 or 3 mm. or more in length. These are placed like tent poles at various angles about 0.5 mm. apart, forming a rough open-work figure inclosing a central space between the points of intersection of the poles. The open spaces in the wall are then filled in with shorter fragments of spicules carefully selected for length, so as just to fill the required space. The animal thus secures the nearest possible approach to a spherical chamber obtainable with the material employed, the salient angles being the points where two or more of the "tent poles" join. The long spicules employed as "tent-poles" project irregularly all over the surface of the test in perfect specimens, and probably serve a secondary purpose as catamaran spars in supporting the animal in the surface layer of ooze. They are, however, very fragile, and are frequently more or less damaged, if not destroyed, in the process of cleaning the dredged material.
>
> The internal cavity of the test is quite devoid of projecting spicules and is not coated with cement.
>
> As a rule, spicules only are employed in the construction of the test, but occasionally a minute grain of sand or flake of mica is used to close the little corner space where two or more "tent-pole" spicules meet at an acute angle. Still more rarely this angular space is left unclosed, thus constituting an aperture to the test. The presence of such apertures must, however, be regarded as abnormal.
>
> Composite specimens were found with two to five individuals in an irregular mass. The only union between such specimens is that they have used in common one or more of the same long spicules. Usually the groups are irregular, but in one of the

figured groups it is a linear series of three distinct chambers unconnected except by the elongate "tent-pole" spicules.

We have experienced some hesitation in allotting this interesting species to its genus. In spite of the selective power displayed, the test is evidently of the simplest type of Rhizopod structure, and the absence of a definite oral aperture combined with the evidence which we have discovered of selective power in another unquestionable species of *Psammosphaera* (*P. bowmanii*, sp. n.), has guided us in our decision to refer the specimen to the genus *Psammosphaera*.

P. rustica, though never of very frequent occurrence, is met with at several of the *Goldseeker* stations round the coast of Scotland. It occurs most frequently at Stations IX and IX*B* in the North Sea (61° 34′ N.; 2° 4′ E., 390 meters), and stations 53 (59° 36′ N.; 70° W., 1,000 meters) and haul 228 (57° 59′ N.; 10° 34′ W., 1,600 meters), on the west coast of Scotland, but occasional specimens are to be met with at intermediate localities and depths.

PSAMMOSPHAERA TESTACEA (Flint).

Plate 15, figs. 1-3.

Psammosphaera fusca, var. *testacea* Flint, Ann. Rep. U. S. Nat. Mus., 1897 (1899), p. 268, pl. 8, fig. 2.—Heron-Allen and Earland, Journ. Roy. Micr. Soc., 1913, p. 18, pl. 2, fig. 9.

Psammosphaera fusca Heron-Allen and Earland, Journ. Quekett Micr. Club, ser. 2, vol. 10, 1909, pl. 33, fig. 4.

Description.—Test free, subspherical, wall composed of the empty tests of other foraminifera, cemented firmly, the interior of the single chamber smooth, exterior very rough; no definite aperture, the fine interstitial openings apparently serving for apertures.

Diameter, up to 3 mm.

Distribution.—Flint described this form from the Gulf of Mexico, *Albatross* stations D2358, 2383, and 2399, in 196 to 1,181 fathoms. Heron-Allen and Earland record it from about Great Britain. It has occurred frequently in Globigerina ooze. In their paper Heron-Allen and Earland record the species at but 7 out of 145 stations from which material was examined, and at only 2 of these was it recorded as common. These were in 362 and 1,600 meters, the latter off St. Kilda, west of the Hebrides, in *Globigerina-ooze.* They give the following note. In comparing this with *P. parva*, "*P. fusca*, var. *testacea* is of an entirely different habit. It can not in any way be regarded as a selective organism, but rather as a *Psammosphaera* which utilizes the tests of other Foraminifera in the construction of its 'house' merely because they chance to be the material most ready to hand."

Psammosphaera testacea—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
.....	U.S.N.M.	....	D 2043...	39 49 00 N.; 68 28 30 W.	1,467	38.5	glob. oz.....	Few.
9781	U.S.N.M.	1	D 2052...	39 40 05 N.; 69 21 25 W.	1,098	45	glob. oz.....	Rare.
9782	U.S.N.M.	4	D 2097...	37 56 20 N.; 70 57 30 W.	1,917	....	glob. oz.....	Few.
9418	U.S.N.M.	5	D 2550...	39 44 30 N.; 70 30 45 W.	1,081	38.5	br. m.......	Few.
9419	U.S.N.M.	2	H 67.....	16 13 45 N.; 64 22 30 W.	2,069	....	co. s. for. sh.	Few.

Genus SOROSPHAERA H. B. Brady, 1879.

Sorosphaera H. B. Brady (type, *S. confusa* H. B. Brady), Quart. Journ. Micr. Sci., vol. 19, 1879, p. 28; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 251.—Rhumbler, Arch. Prot., vol. 3, 1903, p. 235.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 37.

Description.—Test consisting of a colony of more or less inflated chambers, without definite apertures, the walls joined to one another, composed of sand grains with interstitial openings.

A single species *S. confusa* H. B. Brady is known.

SOROSPHAERA CONFUSA H. B. Brady.

Plate 15, figs. 4, 5.*

Sorosphaera confusa H. B. Brady, Quart. Journ. Micr. Sci., vol. 19, 1879, p. 28, pl. 4, figs. 18, 19; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 251, pl. 18, figs. 9, 10.—Rhumbler, Arch. Prot., vol. 3, 1903, p. 235, fig. 63 (in text).—Cushman, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 37, figs. 31, 32 (in text).—Pearcey, Trans. Roy. Soc. Edinburgh, vol. 49, 1914, p. 1000.

The original description was as follows:

> Test free, consisting of a number of inflated or spherical chambers of nearly uniform size, irregularly crowded together and adhering to each other by their outer surfaces. Walls thin, finely arenaceous in texture, with minute interstitial orifices. General aperture wanting. Diameter of individual chambers about one twenty-fifth of an inch (1 mm.) of the entire colony, variable, sometimes one-sixth of an inch (4.5 mm.).

Distribution.—The following stations are given in the *Challenger* report for this species: South of the Rockall Bank, 630 fathoms; Faroe Channel, 542 fathoms; off Drobak, Norway; off the Azores, 900 fathoms; North Pacific, 2,900 fathoms. Pearcey records several specimens from the Weddell Sea in the Antarctic.

In the *Albatross* material that I have examined the species has occurred but once, then as a single but very typical specimen from D2043 in 1,467 fathoms, bottom temperature 38.5° F. (39° 49′ N.; 68° 28′ 30″ W.). This specimen (U.S.N.M., No. 9887) was composed of six portions, all attached with a common center as the basis but in an irregular manner. It was a reddish brown in color, made of fine sand grains, with apparently a ferruginous cement, the material near the center of the mass of a lighter color. The figure and description are from Brady.

Genus STORTHOSPHAERA F. E. Schulze, 1875.

Storthosphaera F. E. Schulze (type, *S. albida* F. E. Schulze), II Jahresb. Comm. wiss. Untersuch. deutsch. Meer in Kiel, 1875, p. 113.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 240.—Schaudinn, Verh. Deutsch. Zool. Ges., 1899, p. 238.—Rhumbler, Arch. Prot., vol. 3, 1903, p. 235.

Description.—Test free, irregularly rounded, single chambered; wall thick, composed of fine whitish sand very loosely cemented, no visible aperture.

The genus is represented by the following species:

STORTHOSPHAERA ALBIDA F. E. Schulze.

Plate 15, figs. 6–8; plate 16, figs. 1–3.

Storthosphaera albida F. E. Schulze, II Jahresb. Comm. wiss. Untersuch. deutsch. Meer in Kiel, 1875, p. 113, pl. 2, figs. 9*a–d*.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 241, pl. 25, figs. 15–17.—Egger, Abh. kon. bay. Akad. Wiss. München, vol. 18, 1893, p. 254, pl. 5, figs. 60, 61.—Goës, Köngl. Svensk. Vet. Akad. Handlingar, vol. 25, No. 9, 1894, p. 13.—Flint, Rep. U. S. Nat. Mus., 1897 (1899), p. 233, pl. 4, fig. 2.—Rhumbler, Arch. Prot., vol. 3, 1903, p. 235, fig. 64 (in text).—Heron-Allen and Earland, Trans. Linn. Soc. London, vol. 11, pt. 13, 1913, p. 218.

Description.—Test free,. rounded, ovoid or irregular in shape, consisting of a single chamber without divisions of any kind; wall of variable thickness, loosely cemented, consisting of fine white sand or amorphous material, interior smooth, rounded; exterior roughened by numerous protuberant points and ridges; no visible aperture; color whitish or grayish brown.

Diameter, up to 3 mm., usually less.

Distribution.—No well characterized material of this species was dredged by the *Challenger*, according to Brady, who records the following stations: Coast of Norway, Bukkenfiord, 365 fathoms (Schulze); Kors Fiord, 180 fathoms (Norman); Faroe Channel, 530 fathoms (Murray); and Bay of Biscay (Norman). A poor specimen possibly referable to this species was obtained by the *Challenger* from station 323, in 1,900 fathoms, in the South Atlantic.

Flint records the species from *Albatross* D2385, in 730 fathoms, in the Gulf of Mexico.

In the material I have had it has been very scarce, the following stations only having given it: D2174 in 1,594 fathoms, D2208 in 1,178 fathoms, and D2716 in 1,631 fathoms, all southwestward of Georges Banks, and D2399 in 196 fathoms and D2385 in 730 fathoms, both in the Gulf of Mexico.

Storthosphaera albida—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
9889	U.S.N.M.	1	D2174....	38 15 00 N.; 72 03 00 W.	1,594	....	gy. m.......	Few.
9890	U.S.N.M.	1	D2208....	39 33 00 N.; 71 16 15 W.	1,178	38.4	gn. m........	Rare.
9891	U.S.N.M.	1	D2385....	28 51 00 N.; 88 18 00 W.	730	40.	gy. m........	Few.
9513	U.S.N.M.	3	D2399....	28 40 00 N.; 86 18 00 W.	196	51.6	gy. m.......	Few.
9514	U.S.N.M.	1	D2716....	38 29 30 N.; 70 57 00 W.	1,631	....	br. oz. for...	Rare.

STORTHOSPHAERA ELONGATA, new species.

Plate 18, figs. 1, 2; plate 19, fig. 1.

Description.—Test free, elongate, in the longest specimens more than twice as long as wide, consisting of a single undivided cavity, wall comparatively thin, composed of a felted mass of fine amorphous material and a large percentage of acerose sponge spicules with little or no cement; aperture not developed, surface smooth, color grayish white.

Length, up to 8 mm.

Distribution.—The type-specimen (No. 10002, U.S.N.M.) is from *Albatross* station D2084, south of Georges Bank, in 1,290 fathoms (40° 16′ 50″ N.; 67° 05′ 15″ W.), bottom temperature 40° F. Other specimens were obtained at this station (No. 9892, U.S.N.M.) and at D2571 in 1,356 fathoms in the same general region.

This species in some ways resembles *Crithionina pisum* but is elongate, compressed, and has a thinner test.

Genus IRIDIA Heron-Allen and Earland, 1914.

Iridia Heron-Allen and Earland (type, *Iridia diaphana* Heron-Allen and Earland), Trans. Zool. Soc. London, vol. 20, pt. 12, 1914, p. 371.

Description.—Test usually attached, consisting of a single chamber lined with a chitinous, transparent membrane, the outer surface consisting of sand grains or other foreign material built up in a dome-shaped test, more or less hemispherical, aperture usually wanting.

The following species is described by the authors:

IRIDIA DIAPHANA Heron-Allen and Earland.

Thurammina papillata (?) Earland, Journ. Quekett Micr. Club, ser. 2, vol. 9, 1905, p. 201, pl. 11, figs. 6, 7: pl. 14, figs. 1-3.—Heron-Allen and Earland, Journ. Roy. Micr. Soc., 1909, p. 323.

Webbina hemisphaerica (?) Heron-Allen and Earland, Journ. Roy. Micr. Soc., 1909, p. 325, pl. 15, fig. 14.

Iridia diaphana Heron-Allen and Earland, Trans. Zool. Soc. London, vol. 20, 1914, p. 371, pl. 36, p. 607; Trans. Linn. Soc. London, vol. 11, 1916, p. 218; Journ. Roy. Micr. Soc., 1916, p. 37.

The original description of this species is as follows:

> Test adventitious, usually attached, but occasionally more or less free, consisting of a single cavity lined with a chitinous and diaphanous membrane or pellicle. The animal commences its existence as a small hemispherical dome-shaped chamber, white or light gray in color, attached to sand grains or shell fragments, and constructed of very fine particles of mud and sand cemented together in a rather friable test with a chitinous lining. This chitinous lining is usually continued as a "floor" to the dome-shaped chamber, but in the youngest stage the chitinous "floor" is perhaps not always present. This early dome stage is sometimes furnished with an aperture at the side or top of the dome, but quite as often no special aperture is visible. The test increases in size by the protrusion of the protoplasm in irregular masses, which proceed to secrete a covering investment of sand grains of varying sizes, attached to the chitinous lining. The construction of the test becomes coarser with the growth of the organism, and the color becomes darker. With each increase in the size of the test, the inclosing wall of the preceding stage is absorbed so as to leave an undivided cavity, the shape of which varies according to the direction and manner in which additions to the original chamber have been made. In rare instances

the test spreads as a furcating tube attached to the host. The external surface of the organism is very irregular in outline, owing to the haphazard mode of growth, and the internal cavity may for the same reason become quite irregular and contorted.

Diameter in the largest specimens, 8 mm.

Distribution.—Originally described by the authors from the Kerimba Archipelago off the southeastern coast of Africa, in comparatively shallow water, it has also been recorded by them from South Cornwall, England, and off the west of Scotland. These latter specimens from the Atlantic, however, were of much smaller size than the tropical ones. In the *Albatross* material I have been unable to find any material referable to this species. The authors give a long discussion of the synonymy of this species in the paper last referred to in the synonymy given here.

Genus RHAPHIDOSCENE Vaughan Jennings, 1896.

Rhaphidoscene VAUGHAN JENNINGS (type, *R. conica* Vaughan Jennings) Journ. Linn. Soc., vol. 25, 1896, p. 320.—RHUMBLER, Arch. Prot., vol. 3, 1903, p. 225.—HERON-ALLEN and EARLAND, Trans. Zool. Soc., vol. 20, 1915, p. 608.

Description.—Test attached, conical, base broad extending to a point at the outer end; chamber single; wall composed of sponge spicules arranged lengthwise of the test with a cement of white calcareous amorphous material; aperture indistinct, at the outer pointed end of the test.

The single species of the genus seems to be largely limited to cold waters of the North Atlantic, although Heron-Allen and Earland place in the same category a form found by them in the Kerimba Archipelago off the southwestern coast of Africa.

RHAPHIDOSCENE CONICA Vaughan Jennings.

Plate 17.

Rhaphidoscene conica VAUGHAN JENNINGS, Journ. Linn. Soc. London, vol. 25, 1896, pp. 320–321, pl. 10.—CHAPMAN, The Foraminifera, London, 1902, p. 117, pl. 5, fig. H.—RHUMBLER, Arch. Prot., vol. 3, 1903, p. 226, fig. 50 (in text).—HERON-ALLEN and EARLAND, Trans. Zool. Soc., London, vol. 20, 1915, p. 608, pl. 46, figs. 16, 17 [?].

Description.—Test attached, conical, basal end broad, tapering to the pointed apertural end, single chambered; wall composed of long, acerose sponge spicules extending nearly the whole length of the test laid longitudinally side by side, interspersed with some fine sand grains and cement; color whitish; aperture not definite but probably at the outer pointed end.

Diameter, 1 mm.

Distribution.—The type station for this species is one of the *Porcupine* dredgings in the Faroe Channel in 440 fathoms, attached to the test of *Botellina labyrinthica.* Heron-Allen and Earland record the occurrence of a specimen from haul 119, *Goldseeker*, also in the Faroe Channel, 60° 34′ N., 4° 32′ W., depth 965 meters, attached to a pebble. This specimen was much larger than the type, "being

3 mm. in diameter, the cone much depressed and exhibiting a well-marked apical aperture closed in with fine sand grains. The walls of the cone in the *Goldseeker* specimen are entirely composed of acerate sponge spicules laid regularly side by side as in the type."

The same authors refer a specimen attached to *Zostera* from shallow water in the Kerimba Archipelago to this species. The arrangement of the spicules is very different in their figured specimen, and the materials are differently arranged. This latter may be a new genus and species of shallow-water habitat in tropical regions.

The following notes are from the original paper of Vaughan Jennings:

> The spicular structure is in this case the more remarkable since there can be no question as to the abundance of other material at hand. The *Botellina* shells are constructed of coarse sand grains, and by far the greater part of the dredging consists of similar material. In fact, the contrast between these delicate spicular cones and the coarse sandy structure of the organism on which they rest is one of the most striking instances I know of the selective power in Protozoa.
>
> At the base the shell is fixed to the rough surface of the *Botellina* by a small amount of a white, doubtless calcareous, cement; but in the walls there is very little interstitial matter.
>
> In the dry specimen the apex of the cone is closed; but I should think it probable that in the living condition the spicules were more or less mobile, so as to separate to some extent at the top, and allow a free passage of the protoplasm to the exterior.

Such a species as this brings to mind at once the question of how it may be formed. If *Botellina* is a comparatively fixed form, any attached specimen on it would have little opportunity of gathering such complete spicules as the test of *Rhaphidoscene conica* shows in sufficient quantity to produce such a test. May it not be that the individual exists for a time like a plasmodium or other naked protoplasm capable of free movement, and therefore of ingesting spicules, until it finally settles down and uses these spicules in the construction of a definitely placed, attached test? This would not be so unlike the process adopted by some of the other Rhizopods in the construction of their test.

Genus SACCAMMINA Carpenter, 1869.

Saccammina (type, *S. sphaerica* M. Sars) G. O. SARS, Förh. Selsk. Christiania, 1868 (1869), p. 248 (*nomen nudum*).—CARPENTER, Ann. Mag. Nat. Hist., ser. 4, vol. 4, 1869, p. 289.—BÜTSCHLI, in Bronn, Klassen und Ordnungen Thierreichs, vol. 1, 1880, p. 195.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 252.—RHUMBLER, Zeitschr. Wiss. Zool., vol. 57, 1894, p. 462.—EIMER and FICKERT (part), Zeitschr. Wiss. Zool., vol. 65, 1899, p. 671.—RHUMBLER, Arch. Prot., vol. 3, 1903, p. 242.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 38.—RHUMBLER, Foram. Plankton Exped., Teil 2, 1913, p. 375.

Description.—Test typically free, sometimes attached, consisting of a single chamber or of several spherical chambers with distinct apertures, usually one for each chamber; wall composed of sand grains finely cemented by a yellowish or brownish cement; aperture circular, usually with a short neck.

Rhumbler has argued that *Psammosphaera* is the immature form of this genus, but Heron-Allen and Earland seem to have shown conclusively that the two are distinct.

SACCAMMINA SPHAERICA G. O. Sars.

Plate 16, figs. 4, 5; plate 19, figs. 2-5.

Saccammina sphaerica (M. Sars, *nomen nudum*, Förh. Selsk. Christiania, 1868 (1869), p. 248), G. O. Sars, Förh. Selsk. Christiania, 1871, p. 250.—Carpenter, The Microscope, ed. 5, 1875, p. 532, figs. 272*a–c*.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 253, pl. 18, figs. 11-17.—Egger, Abh. Bay. Akad. Wiss. München, vol. 18, 1893, p. 254, pl. 4, fig. 8.—Rhumbler, Zeitschr. Wiss. Zool., vol. 57, 1894, pp. 433-619, pls. 21-25.—Goës, Köngl. Svensk. Vet. Akad. Handl., vol. 25, No. 9, 1894, p. 13, pl. 3, figs. 16-18.—Chapman, Proc. Zool. Soc. London, 1895, p. 13.—Goës, Bull. Mus. Comp. Zoöl., vol. 29, 1896, p. 26.—Flint, Rep. U. S. Nat. Mus., 1897 (1899), p. 269, pl. 9, fig. 2.—Rhumbler, Arch. Prot., vol. 3, 1903, p. 243, figs. 78*a–d* (in text).—Dakin, Rep. Ceylon Pearl Oyster Fish., vol. 5, 1906, p. 232.—Heron-Allen and Earland, Journ. Quekett Micr. Club, ser. 2, vol. 10, 1909, pl. 34, figs. 5, 5*a*.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 39, figs. 33-36 (in text).—Heron-Allen and Earland, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 40; Journ. Roy. Micr. Soc., 1913, p. 15, pl. 1, figs. 1-19, pl. 2, figs. 1, 2.—Pearcey, Trans. Roy. Soc. Edinburgh, vol. 49, 1914, p. 1,000.

Description.—Test typically free, rarely attached, spherical or pyriform; consisting of a single chamber without divisions, wall of fairly coarse sand grains, firmly cemented, interior smooth, exterior usually smooth, in specimens with very large sand grains and small test somewhat roughened, but the interstices usually partly at least filled by cement; aperture single, circular, with a very slight neck protruding from the surface of the test; color variable, from light grayish white to nearly black.

Diameter, 1–3.5 mm.

Distribution.—This seems to be universally distributed in the deeper waters of all the oceans, being recorded from all the great ocean basins, and is known from the Antarctic Ice Barrier to the Arctic off Greenland and Franz Joseph Land. On the eastern side of the Atlantic it is recorded from Norway, North Sea, about the British Isles, Faroe Channel, Bay of Biscay, and off the coast of Africa. On the western side it is recorded by Flint from off the coast of Brazil, *Albatross* D2760, in 1,019 fathoms.

In the *Albatross* dredgings which I have examined the species occurs at numerous stations from Nova Scotia southward along the coast and in the Gulf of Mexico. These stations range in depth from 82 to 2,045 fathoms and bottom temperatures from 34.4° to 40.7° F.

The development of *S. sphaerica* has been noted by Heron-Allen and Earland. The smallest specimens are usually pear shaped and the material of the test comparatively coarser and the aperture a mere chink at the protuberant end. Two forms are usually observed, one in which the particles of the test are small and the test smoothly finished, the other using larger grains and consequently a rougher surfaced test. As the specimen develops it becomes more nearly spherical and the nipplelike apertural neck becomes apparent.

A variety of this species from the Faroe Channel is noted. It has a very rough test using "large tetractinellid spicules as a support-framework for the shell." Usually these have no protuberant neck, "the aperture being usually an irregular and large opening, nearly flush with the shell wall and lined with pale cement." This variety, apparently worthy of varietal rank, may be known as *Saccammina sphaerica*, var. *anglica*, new variety. It is plate 1, figures 15–19, of Heron-Allen and Earland's paper in the Journal of the Royal Microscopical Society for 1913.

Saccammina sphaerica—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°*F.*		
9843	U.S.N.M.	10+	D2003....	37 16 30 N.; 74 20 36 W.	641			Common.
9844	U.S.N.M.	2	D2018....	37 12 22 N.; 74 20 04 W.	788	39	bu. m.......	Few.
9845	U.S.N.M.	1	D2036....	38 52 40 N.; 69 24 40 W.	1,735	38	glob. oz.....	Rare.
9846	U.S.N.M.	1	D2038....	38 30 30 N.; 69 08 35 W.	2,033		glob. oz.....	Rare.
9847	U.S.N.M.	3	D2043....	39 49 00 N.; 68 28 30 W.	1,467	38.5	glob. oz.....	Few.
9848	U.S.N.M.	2	D2115....	35 49 30 N.; 74 34 45 W.	843	39	m. fne. s....	Rare.
9849	U.S.N.M.	3	D2116....	35 45 23 N.; 74 31 25 W.	888	39	bu. m. fne. s.	Few.
9850	U.S.N.M.	8	D2171....	37 59 30 N.; 73 48 40 W.	444	39.5	gn. m.......	Common.
9851	U.S.N.M.	1	D2203....	39 34 15 N.; 71 41 15 W.	705	38.9	gn. m. s.....	Rare.
9852	U.S.N.M.	1	D2205....	39 35 00 N.; 71 18 45 W.	1,073	38.1	gy. oz.......	Rare.
9853	U.S.N.M.	6	D2212....	39 59 30 N.; 70 30 45 W.	428	40	gn. m.......	Few.
9428	U.S.N.M.	3	D2221....	39 05 30 N.; 70 44 30 W.	1,525	36.9	gy. oz.......	Few.
9429	U.S.N.M.	2	D2226....	37 00 00 N.; 71 54 00 W.	2,045	36.8	glob. oz.....	Few.
9430	U.S.N.M.	3	D2228....	37 25 00 N.; 73 06 00 W.	1,582	36.8	br. m.......	Few.
9431	U.S.N.M.	1	D2231....	38 29 00 N.; 78 09 00 W.	965	36.8	gy. oz.......	Rare.
9432	U.S.N.M.	2	D2234....	39 09 00 N.; 72 03 15 W.	810	38.6	gn. m.......	Rare.
9854	U.S.N.M.	1	D2262....	39 54 45 N.; 69 29 45 W.	250	41.6	gn. m. s.....	Rare.
9855	U.S.N.M.	1	D2335....	43 10 39 N.; 82 20 21 W.	204			Rare.
9856	U.S.N.M.	2	D2385....	28 51 00 N.; 88 18 00 W.	730	40.1	gy. m.......	Rare.
9857	U.S.N.M.	1	D2392....	28 47 30 N.; 87 27 00 W.	724	40.7	br. gy. m....	Rare.
9433	U.S.N.M.	10+	D2425....	36 20 24 N.; 74 46 30 W.	119	51.5	dk. gy. m. fne. s.	Common.
9434	U.S.N.M.	1	D2504....	44 23 00 N.; 61 22 45 W.	82	40.6	bk. m. g.....	Rare.
9435	U.S.N.M.	4	D2531....	40 42 00 N.; 66 33 00 W.	852	34.4	gy. m.......	Few.
9436	U.S.N.M.	2	D2547....	39 54 30 N.; 70 20 00 W.	390	39.6	gn. m.......	Few.
9437	U.S.N.M.	10+	D2550....	39 44 30 N.; 70 30 45 W.	1,081	38.5	br. m.......	Common.
9438	U.S.N.M.	3	D2552....	39 47 07 N.; 70 35 00 W.	721	39.6	gy. oz.......	Few.
9439	U.S.N.M.	1	D2562....	39 15 30 N.; 71 25 00 W.	1,434	37.3	gy. oz.......	Rare.
9440	U.S.N.M.	1	D2581....	39 43 00 N.; 71 34 00 W.	394		gn. m.......	Rare.
9858	U.S.N.M.	4	D2677....	32 39 00 N.; 76 50 30 W.	478	39.3	gn. m.......	Few.
9441	U.S.N.M.	5	H79......	14 20 30 N.; 63 10 00 W.	821		co. s. sh. for.	Few.
9442	U.S.N.M.	1	H133.....	11 23 20 N.; 66 19 00 W.	533		gy. m. for...	Rare.
6268	U.S.N.M.			Loffoden Islands........				
			Fish Hawk					
9859	U.S.N.M.	10+	949					Common.

SACCAMMINA SOCIALIS H. B. Brady.

Saccammina socialis H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 255, pl. 18, figs. 18, 19.—Chapman, Proc. Zool. Soc. London, 1895, p. 13.—Rhumbler, Arch. Prot., vol. 3, 1903, p. 244, fig. 79 (in text).—Cushman, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 40, figs. 37, 38.—Rhumbler, Foram, Plankton-Exped., pt. 1, 1911, pl. 1, fig. 10*a*, *b*; pt. 2, 1913, p. 376.—Pearcey, Trans. Roy. Soc. Edinburgh, vol. 49, 1914, p. 1000.

Saccammina consociata Flint, Ann. Rep. U. S. Nat. Mus., 1897 (1899), p. 269, pl. 9, fig. 3.

The following extracts are taken from descriptions by earlier authors:

Test consisting of several independent arenaceous chambers, individually spherical or subspherical in shape and of nearly even size, attached to each other by their outer surfaces, but without stoloniferous intercommunication, each chamber having its own external aperture. Spheres seldom more than six or eight in number, and usually arranged with more or less regularity. Texture finely sandy, nearly smooth externally. Diameter of the individual chambers, one-thirtieth of an inch (0.8 mm.) or less.—(H. B. Brady.)

Free or adherent, subglobular; surface coarse and rough; walls thin, composed of rather coarse sand mixed with sponge spicules; color a rich reddish brown; orifices one or several, at the end of long slender tubes. Generally united into colonies, either in straight series, or curved, or confused, connected by stoloniferous tubes. Diameter of individual tests, 0.4 to 0.8 mm. (one-sixtieth to one-thirtieth inch).—(Flint.)

Distribution.—The records for this species are very few. North Atlantic, south of Rockall Bank, 1,263 fathoms (Brady); Faroe Channel (Pearcey); off Bahia, Brazil (Flint); Antarctic (Pearcey); North Pacific (Brady).

I have seen material only from *Albatross* D2760, off Bahia, Brazil, 1,019 fathoms, the stations recorded by Flint for *S. consociata* (U.S.N.M. No. 9860).

Both descriptions are given, that of *S. socialis* H. B. Brady and *S. consociata* Flint. The two agree very closely except in the matter of stoloniferous connections, which do not appear to be definite in the material I have seen. Therefore I have brought the two together, although larger series of material may show real differences.

SACCAMMINA MINUTA Rhumbler.

Plate 20, fig. 5.

Saccammina minuta Rhumbler, Foram. Plankton-Exped., pt. 1, 1911, pl. 1, figs. 8, 9; pt. 2, 1913, p. 375.

Description.—Test free or fixed, generally spherical, when fixed the lower side flattened, aperture often represented by a short tube coming out between the sand grains, usually inconspicuous.

Diameter, 0.18–0.42 mm.

Distribution.—Rhumbler records this species from the Plankton-Expedition stations, off the Hebrides, in 2,275 meters, and near St. Vincent, 4,980 meters.

The figure is from Rhumbler

Genus PROTEONINA Williamson, 1858.

Proteonina Williamson (type, *P. fusiformis* Williamson), Recent Foraminifera of Great Britain, 1858, p. 1 (not *Proteonina* Terquem 1875).—Rhumbler, Arch. Prot., vol. 3, 1903, p. 244.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 40.—Rhumbler, Foram. Plankton Exped., pt. 2, 1913, p. 377.—Pearcey, Trans. Roy. Soc. Edinburgh, vol. 49, 1914, p. 1000.

Reophax (part) H. B. Brady, Quart. Journ. Micr. Sci., vol. 19, 1879, p. 51; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 289.—Bütschli, in Bronn, Klassen und Ordnungen Thierreichs, vol. 1, 1880, p. 199.

Reophax RHUMBLER, Nachr. Köngl. Ges. Wiss. Göttingen, 1895, p. 82.

Difflugia EGGER, Abh. Köngl. Bay. Akad. Wiss. München, vol. 18, 1895, p. 251 (not *Difflugia* Leclerc, 1815).

Saccammina (part) EIMER and FICKERT, Zeitschr. Wiss. Zool., vol. 65, 1899, p. 671.

Description.—Test free, consisting of a single undivided chamber, flask shaped or fusiform with a single aperture, wall composed of coarse sand grains, mica flakes, or other foreign material, test usually broadest near the base and gradually tapering more or less evenly to the apertural end; aperture usually circular, with commonly a slight neck which in some species is prominent and extended.

The species described here of mica flakes is a new form of test for this group, although it is known in *Reophax*, *Psammosphaera*, etc.

PROTEONINA FUSIFORMIS Williamson.

Proteonina fusiformis WILLIAMSON, Recent Foraminifera of Great Britain, 1858, p. 1, pl. 1, fig. 1.—RHUMBLER, Arch. Prot., vol. 3, 1903, p. 248, fig. 84 (in text).—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 41, fig. 39 (in text).—RHUMBLER, Foram. Plankton-Exped., pt. 1, 1911, pl. 2, fig. 15; pt. 2, 1913, p. 379.

Reophax fusiformis H. B. BRADY, Denkschr. Kongl. Akad. Wiss. Wien, vol. 43, pt. 2, 1882, p. 99; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 290, pl. 30, figs. 7–11.—H. B. BRADY, PARKER, and JONES, Trans. Zool. Soc., vol. 12, 1888, p. 217, pl. 41, fig. 18.—MILLETT, Journ. Roy. Micr. Soc., 1899, p. 253, pl. 4, fig. 11.—BAGG, Proc. U. S. Nat. Mus., vol. 34, 1908, p. 125.—HERON-ALLEN and EARLAND, Proc. Roy. Irish Acad., vol. 31, No. 64, 1913, p. 42.—CHAPMAN, Zool. Results *Endeavour*, vol. 3, pt. 1, 1915, p. 15.—HERON-ALLEN and EARLAND, Trans. Linn. Soc. London, vol. 11, 1916, p. 222.

Lituola fusiformis J. WRIGHT, Rep. Belfast Club, 1876–77, Append., table.

Lituola nautiloidea, var. *scorpiurus* W. B. CARPENTER, in Parker and Jones, Introduction to the Study of the Foraminifera, 1862, Append., p. 309.

Description.—Test free, fusiform, asymmetrical, chamber usually single, sometimes incompletely divided by projections of the wall; wall composed of coarse sand grains, rough on the exterior, firmly cemented; aperture terminal, circular.

Length, up to 1 mm.

Distribution.—Brady records this species from various stations about the British Isles and to the northward as far as 78° 40′ N. It occurs occasionally on the western side of the Atlantic, but not nearly as often as *P. difflugiformis*.

PROTEONINA DIFFLUGIFORMIS (H. B. Brady).

Plate 21, figs. 1, 2.

Reophax difflugiformis H. B. BRADY, Quart. Journ. Micr. Sci., vol. 19, 1879, p. 51, pl. 4, figs. 3*a*, *b*; Denkschr. Akad. Wiss. Wien, vol. 43, pt. 2, 1882, p. 99; Proc. Roy. Soc. Edinburgh, vol. 11, 1882, p. 715; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 289, pl. 30, figs. 2–4 (not 1, 5).—GOËS, Kongl. Svensk. Vet. Akad. Handl., vol. 25, No. 9, 1894, p. 26, pl. 6, figs. 196–198; Bull. Mus. Comp. Zoöl., vol. 29, 1896, p. 28.—FLINT, Rep. U. S. Nat. Mus., 1897 (1899), p. 272, pl. 16, fig. 2.—MILLETT, Journ. Roy. Micr. Soc., 1899, p. 252.—DAKIN, Rep. Ceylon Pearl Oyster Fisheries, vol. 5, 1906, p. 232.—HERON-ALLEN and EARLAND, Proc. Roy. Irish Acad., vol. 31, No. 64, 1913, p. 42, Trans. Zool. Soc. vol. 20, 1915, p. 612; Trans. Linn. Soc. London, vol. 11, 1916, p. 222; Journ. Roy. Micr. Soc., 1916, p. 40.

Saccammina difflugiformis EIMER and FICKERT, Zeitschr. Wiss. Zool., vol. 65, 1899, p. 671.

Proteonina difflugiformis RHUMBLER, Arch. Prot., vol. 3, 1903, p. 245, figs. 80*a*, *b* (in text).—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 42; figs. 40, 41 (in text).—RHUMBLER, Foram. Plankton-Exped., pt. 1, 1911, pl. 2, figs. 7-14, pt. 2, 1913, p. 378.—PEARCEY, Trans. Roy. Soc. Edinburgh, vol. 49, 1914, p. 1000.

Description.—Test free, consisting of a single elongate oval or pyriform chamber with a more or less distinct tubular neck usually tapering gradually from the body of the chamber, undivided; wall fairly thick, of sand grains of variable size, firmly cemented or in small specimens with an excess of cement and fairly smooth; aperture circular, simple, terminal.

Length, up to 0.75 mm.

Distribution.—The distribution of this simple species is so extensive that little detailed mention need be given. It is recorded both from the Arctic and to the Antarctic Circle, in shallow water from the coasts of Europe, common along our own Atlantic coast and from the Gulf of Mexico, off Brazil, and off the Falklands.

The shape is often irregular, due to the incorporation of a large sand grain at the side, and thus causing a very prominent angle at one side. The material varies greatly and with it the color of the specimen, the small ones often as noted by Heron-Allen and Earland[1] composed largely of ferruginous cement while in large specimens the cement is not noticed among the coarse sand grains. Rhumbler figures specimens made up almost entirely of the broken fragments of other foraminiferal tests, especially Globigerinae.

Proteonina difflugiformis—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
9739	U.S.N.M.	7	D2018....	37 12 22 N.; 74 20 04 W.	788	39	bu. m.......	Common.
9740	U.S.N.M.	2	D2093....	39 42 50 N.; 71 01 20 W.	1,000	39	s. m.........	Few.
9741	U.S.N.M.	10+	D2111....	35 09 50 N.; 74 57 40 W.	938	....	gn. m.......	Common.
9742	U.S.N.M.	1	D2115....	35 49 30 N.; 74 34 45 W.	843	39	m. fne.s......	Rare.
9743	U.S.N.M.	2	D2171....	37 59 30 N.; 73 48 40 W.	444	39.5	gn. m.......	Rare.
9744	U.S.N.M.	3	D2189....	39 49 30 N.; 70 26 00 W.	600	39.7	gn. m. s......	Few.
9745	U.S.N.M.	2	D2203....	39 34 15 N.; 71 41 15 W.	728	38.9	gn. m. s......	Few.
9746	U.S.N.M.	2	D2204....	39 30 30 N.; 71 44 30 W.	728	39.1	br. m.......	Rare.
9747	U.S.N.M.	1	D2205....	39 35 00 N.; 71 18 45 W.	1,073	38.1	gy. oz.......	Rare.
9748	U.S.N.M.	1	D2212....	39 59 30 N.; 70 30 45 W.	428	40	gn. m.......	Rare.
9749	U.S.N.M.	3	D2217....	39 47 20 N.; 69 34 15 W.	924	38.1	gy. m.......	Few.
9750	U.S.N.M.	2	D2226....	37 00 00 N.; 71 54 00 W.	2,045	36.8	glob. oz......	Rare.
9751	U.S.N.M.	10	D2262....	39 54 45 N.; 69 29 45 W.	250	41.6	gn. m. s......	Common.
9752	U.S.N.M.	1	D2372....	29 15 30 N.; 85 29 30 W.	27	....	g............	Rare.
9753	U.S.N.M.	1	D2394....	28 38 30 N.; 87 02 00 W.	420	41.8	gn. m.......	Rare.
9385	U.S.N.M.	3	D2530....	40 53 30 N.; 66 24 00 W.	956	38.4	gy. oz.......	Few.
9386	U.S.N.M.	1	D2531....	40 42 00 N.; 66 33 00 W.	852	34.4	gy. m.......	Rare.
9387	U.S.N.M.	3	D2550....	39 44 30 N.; 70 30 45 W.	1,081	38.5	br. m.......	Few.
9388	U.S.N.M.	1	D2552....	39 47 07 N.; 70 35 00 W.	721	39.6	gy. oz.......	Rare.
9389	U.S.N.M.	2	D2562....	39 15 30 N.; 71 25 00 W.	1,434	37.3	gy. oz.......	Few.
9390	U.S.N.M.	2	D2568....	39 15 00 N.; 68 08 00 W.	1,781	36.9	gy. oz.......	Few.
9391	U.S.N.M.	1	D2581....	39 43 00 N.; 71 34 00 W.	394	....	gn. m.......	Rare.
9354	U.S.N.M.	1	D2677....	32 39 00 N.; 76 50 30 W.	478	39.3	gn. m.......	Rare.
9755	U.S.N.M.	1	D2761....	15 39 00 N.; 38 32 54 W.	818	39	pter. oz......	Rare.

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[1] Proc. Roy. Irish Acad., vol. 31, 1913, p. 42.

PROTEONINA TESTACEA (Flint).

Plate 20, figs. 1–4.

Reophax difflugiformis H. B. Brady, var. *testacea* Flint, Rep. U. S. Nat. Mus., 1897 (1899), p. 273, pl. 16, fig. 1.

Proteonina difflugiformis-testacea Rhumbler, Arch. Prot., vol. 3, 1903, p. 247, fig. 81 (in text).

Description.—Test irregularly flask shaped, apertural end produced; wall composed of a single layer of empty tests of other foraminifera; interior rather neatly finished, exterior more or less irregular.

Length, up to 2 mm.

Distribution.—The type station for this species is *Albatross* D2234, in 810 fathoms, southward of Long Island. I have had material from this same station and from more than 20 stations from Georges Banks to Cape Hatteras, the Gulf of Mexico, and the Caribbean Sea. It seems worthy of specific rank for it has very definite and constant characters.

Proteonina testacea—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
9756	U.S.N.M.	8	D2037....	38 53 00 N.; 69 23 30 W.	1,731	38	glob. oz.....	Common.
9757	U.S.N.M	4	D2043....	39 49 00 N.; 68 28 30 W.	1,467	38.5	glob. oz.....	Common.
9758	U.S.N.M.	2	D2105....	37 50 00 N.; 73 03 50 W.	1,395	41	glob. oz.....	Rare.
9759	U.S.N.M.	1	D2110....	35 12 10 N.; 74 57 15 W.	516	40	bu. m.......	Rare.
9760	U.S.N.M.	1	D2115....	35 49 30 N.; 74 34 45 W.	843	39	m. fne. s....	Rare.
9761	U.S.N.M.	3	D2174....	38 15 00 N.; 72 03 00 W.	1,594	....	gy. m.......	Few.
9762	U.S.N.M.	1	D2189....	39 49 30 N.; 70 26 00 W.	600	39.7	gn. m. s.....	Rare.
9763	U.S.N.M.	2	D2202....	39 38 00 N.; 71 39 45 W.	515	39.1	gn. m.......	Few.
9764	U.S.N.M.	1	D2212....	39 59 30 N.; 70 30 45 W.	428	40	gn. m.......	Few.
9392	U.S.N.M.	4	D2221....	39 05 30 N.; 70 44 30 W.	1,525	36.9	gy. oz.......	Few.
9393	U.S.N.M.	1	D2222....	39 03 15 N.; 70 50 45 W.	1,537	36.9	gy. oz.......	Rare.
9765	U.S.N.M.	3	D2224....	36 16 30 N.; 68 21 00 W.	2,574	36.8	glob. oz.....	Rare.
9394	U.S.N.M.	2	D2226....	37 00 00 N.; 71 54 00 W.	2,045	36.8	glob. oz.....	Few.
9395	U.S.N.M.	1	D2229....	37 38 40 N.; 73 16 30 W.	1,423	37.7	glob. oz.....	Rare.
9396	U.S.N.M.	4	D2234....	39 09 00 N.; 72 03 15 W.	810	38.6	gn. m.......	Few.
9397	U.S.N.M.	2	D2237....	39 12 17 N.; 72 09 30 W.	520	39.5	gn. m.......	Few.
9766	U.S.N.M.	6	D2377....	27 07 30 N.; 88 08 00 W.	210	67	gy. m.......	Few.
9398	U.S.N.M.	10+	D2399....	28 44 00 N.; 86 18 00 W.	196	51.6	gy. m.......	Common.
9399	U.S.N.M.	2	D2531....	40 42 00 N.; 66 33 00 W.	852	34.4	gy. m.......	Few.
9400	U.S.N.M.	2	D2682....	39 38 00 N.; 70 22 00 W.	1,004	....	gn. m. s.....	Few.
9401	U.S.N.M.	2	D2714....	38 22 00 N.; 70 17 30 W.	1,825	....	br. oz.......	Few.
9402	U.S.N.M.	1	D2751....	16 54 00 N.; 63 12 00 W.	687	40	bu. glob. oz.	Few.

PROTEONINA MICACEA, new species.

Plate 19, figs. 6, 7.

Description.—Test free, single chambered, flask shaped, slightly longer than wide; body portion ovate, with a short cylindrical neck at the apertural end, wall very thin, transparent or translucent, composed of thin mica scales rather firmly cemented together by their edges, the amount of cement used being very small; aperture roughly circular at the end of the cylindrical neck.

Diameter, from 0.25 to 0.80 mm.

Distribution.—Type-specimen from *Albatross* station D2262, in 250 fathoms (39° 54′ 45″ N.; 69° 29′ 45″ W.), bottom temperature

41.6° F.; bottom of green mud and sand. At this station the species was very abundant, the specimens all of the same sort except for minor variations due to the difference in shape and size of the mica scales. (Cat. No. 9768, U.S.N.M.)

In the selective power of this species to choose mica scales for its test it may be compared with *Psammosphaera bowmanni* Heron-Allen and Earland, and also to *Reophax scottii* Chaster, both of which use mica scales in the construction of the test. At first sight it was thought that these specimens from the *Albatross* material might be *P. bowmani*, but they are all typical *Proteonina*, with a definite aperture and a cylindrical neck.

Proteonina micacea—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		° F.		
9767	U.S.N.M.	1	D2018....	37 12 22 N.; 74 20 04 W.	788	39	bu. m.......	Rare.
9768	U.S.N.M.	10+	D2262....	39 54 45 N.; 69 29 45 W.	250	41.6	gn. m. s.....	Common.

PROTEONINA HELENAE Rhumbler.

Plate 20, figs. 6, 7.

Proteonina helenae Rhumbler, Foram. Plankton-Exped., pt. 1, 1911, pl. 2, figs. 16, 17; pt. 2, 1913, p. 380.

Description.—Test free, elongate, fusiform; body portion conical, tapering, the initial end generally bluntly pointed, gradually increasing in diameter to the base of the neck, where the body is strongly constricted and merges into the cylindrical neck, which is longer than wide and of fairly even diameter; wall composed of entire or broken tests of other foraminifera, especially Globigerinidae, rather neatly cemented, the outher surface being fairly smooth; aperture circular, fairly large.

Length, 0.7–1.0 mm.

Distribution.—Rhumbler describes this species from a station off St. Vincent in 4,980 meters.

PROTEONINA HYSTRIX (Egger).

Reophax hystrix Egger, Abh. bay. Akad. Wiss. München, vol. 18, 1893, p. 256, pl. 4, fig. 14.

Proteonina hystrix Rhumbler, Arch. Prot., vol. 3, 1903, p. 248, fig. 86 (in text).

Description.—Test free, somewhat compressed; wall composed of sand grains, with the outside ornamented with an abundance of sponge spicules, all pointing toward the aboral end; apertural end broad, the aperture consisting of a long slit without a definite neck.

Diameter, about 1 mm.

Distribution.—Egger described this species from a single specimen obtained off the Cape Verde Islands in 69 meters. Nothing further is known of the species.

PROTEONINA AMBLYSTOMA Rhumbler.

Proteonina amblystoma RHUMBLER, Foram. Plankton-Exped., pt. 1, 1911, pl. 2, fig. 6; pt. 2, 1913, p. 377.

Description.—Test free, elongate, subcylindrical, main portion or body of the test of about the same diameter as the neck; single chambered, body portion composed of small irregular sand grains; neck portion of larger grains more nearly uniform in size, apertural end nearly as wide as the body of the test.

Length, 0.576 mm.; breadth, 0.234 mm.

Distribution.—Rhumbler describes this species from a single specimen from off the Hebrides in 2,275 meters. The question may arise at once whether this single specimen may not be an abnormal individual of some already described species. It is noted here as a matter of record. I have seen no material referable to it.

Genus LAGENAMMINA Rhumbler, 1911.

Lagenammina RHUMBLER (type, *L. laguncula* Rhumbler), Foram. Plankton-Exped., pt. 1, 1911, pp. 92, 111; pt. 2, 1913, p. 374.

Description.—Test free, bottle shaped, with a pseudochitinous sublayer on which are laid quite thickly, but roughly, small foreign bodies. The presence of this sublayer distinguishes this genus from *Proteonina*, which does not have such a layer.

LAGENAMMINA LAGUNCULA Rhumbler.

Plate 19, fig. 8.

Lagenammina laguncula RHUMBLER, Foram. Plankton-Exped., pt. 1, 1911, pp. 92, 111, pl. 1, fig. 4; pt. 2, 1913, p. 375.

Description.—Test free, bottle shaped, pouch of the bottle oval, stretching out into a slender neck at the broader pole, which is half as long as the body part. The thin under layer shows through the interstices between the outer granules with a yellowish color.

Length, 160–170μ.

Distribution.—This species was described by Rhumbler from two North Atlantic stations in 1,524 and 2,400 meters.

Genus PILULINA W. B. Carpenter, 1870.

Pilulina W. B. CARPENTER (type, *P. jeffreysii* W. B. Carpenter) Descr. Cat. Objects Deep-Sea Dredging [1870], p. 5.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 244.—RHUMBLER, Arch. Prot., vol. 3, 1903, p. 249.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 43.

Description.—Test free, globular or ovate, consisting of a single undivided chamber; wall composed of felted sponge spicules and a slight amount of fine sand without cement, aperture elongate, with a somewhat depressed area about it.

The genus *Pilulina* based upon *P. jeffreysii* by Carpenter is rather rare, known hitherto from but two species, the type from the North Atlantic and a second species, *P. ovata*, which I described from the North Pacific. Where the species occur they are often in great numbers but the known areas of distribution are very limited.

PILULINA JEFFREYSII W. B. Carpenter.

Pilulina, species, W. B. Carpenter, Descr. Catal. Obj. Deep-Sea Dredging 1870, p. 5.

Pilulina jeffreysii W. B. Carpenter, The Microscope, ed. 5, 1875, p. 532, figs. *d*, *e*,; ed. 6, 1881, p. 560, figs. 319*d*, *e*.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 244, pl. 25, figs. 1–6.—Flint, Rep. U. S. Nat. Mus., 1897 (1899), p. 266, pl. 5.—Rhumbler, Arch. Prot., vol. 3, 1903, p. 249, fig. 88.

Description.—Test free, subspherical, or occasionally oval; composed of a single chamber, undivided; wall comparatively thin, made up of long sponge spicules felted together, the interstices filled with broken spicules and a white amorphous material, probably siliceous; smooth both inside and outside; the spicules on the outside more or less longitudinally arranged; aperture an elongate slit, straight or more often doubly curved and S-shaped, with slightly raised lip.

Diameter, up to 3.5 mm.

Distribution.—Brady's specimens of this species were from three stations of the *Porcupine* dredgings south of the Rockall Bank, depths 1,476, 630, and 1,215 fathoms. Flint records the species from the North Atlantic without station. Apparently this is the extent of our recorded knowledge of this species. In the *Albatross* material I have examined it has occurred at the following stations: D2036 in 1,735 fathoms, bottom temperature 38° F.; D2096 in 1,451 fathoms, bottom temperature 37.5° F.; D2221 in 1,525 fathoms, bottom temperature 36.9° F.; and D2229 in 1,423 fathoms, bottom temperature 37.7° F. These stations are southward of Georges Banks. At the latter stations specimens were very abundant, several vials full being obtained from the material.

There apparently is little or no calcareous material used in the wall of the test of this species, the test being unaffected by acids. The peculiarity of its distribution is remarkable, for material was examined from numerous stations in this same region.

Pilulina jeffreysii—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°*F.*		
9712	U.S.N.M.	2	D2036....	38 52 40 N.; 69 24 40 W.	1,735	38	glob. oz.....	Few.
9713	U.S.N.M.	10+	D2096....	39 22 20 N.; 70 52 20 W.	1,451	37.5	glob. oz.....	Abundant.
9925	U.S.N.M.	....	D2221....	39 05 30 N.; 70 44 30 W.	1,525	36.9	gy. oz.......	Abundant.
9537	U.S.N.M.	10+	D2229....	37 38 40 N.; 73 16 30 W.	1,423	37.7	glob. oz.....	Few.

Genus PELOSINA H. B. Brady, 1879.

Pelosina H. B. BRADY (type, *P. variabilis* H. B. Brady), Quart. Journ. Micr. Sci., vol. 19, 1879, p. 30.—BÜTSCHLI, in Bronn, Klassen und Ordnungen Thierreichs, vol. 1, 1880, p. 194.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 235.—RHUMBLER, Arch. Prot., vol. 3, 1903, p. 238.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 45.—RHUMBLER, Plankton-Exped., Foraminiferen, pt. 2, 1913, p. 374.

Description.—Test free, variously formed, rounded, cylindrical or irregularly elongate; wall usually thick, composed of mud with various foreign bodies included in the outer portions; interior with a thin, membranaceous, chitinous layer often extending out and forming the whole wall at the apertural end of some species; aperture typically single and terminal, occasionally multiple in *P. variabilis*.

Several species occur in the Atlantic, but only two, *P. variabilis* and *P. cylindrica*, are known from many stations.

PELOSINA VARIABILIS H. B. Brady.

Plate 22, figs. 1–4.

Pelosina variabilis H. B. BRADY, Quart. Journ. Micr. Sci., vol. 19, 1879, p. 30, pl. 3, figs. 1–3; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 235, pl. 26, figs. 7–9.—FLINT, Rep. U. S. Nat. Mus., 1897 (1899), p. 266, pl. 4, fig. 1.—RHUMBLER, Arch. Prot., vol. 3, 1903, p. 239, fig. 74 (in text).—CHAPMAN, Trans. New Zealand Inst., vol. 38, 1905, p. 83.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 47, fig. 52 (in text).—HERON-ALLEN and EARLAND, Trans. Linn. Soc. London, vol. 11, pt. 13, 1916, p. 218.

Description.—Test irregular, consisting of a single fusiform chamber or of two or three independent chambers, irregularly associated, but usually attached near the apertural end of the main chamber; wall thick, irregular but usually fairly smooth composed of fine mud with more or less irregularly placed foreign bodies at the surface; basal layer thin and membranaceous, chitinous, sometimes extended into a tubular neck at the apertural end; chamber in general conforming to the shape of the whole test; aperture terminal, circular; in some cases multiple and irregularly placed; color of test grayish.

Length, up to 20 mm.; diameter, usually not exceeding 2 mm.

Distribution.—This is by far the most common species of the genus in the Atlantic. In the *Challenger* Report Brady gives the following North Pacific records: Off Cumbrae, 50–60 fathoms (Robertson); west coast of Scotland and coast of Norway (Norman); off Franz Josef Land, 125 fathoms (Austro-Hungarian North Polar Expedition). It is also recorded from the Bay of Biscay (Rhumbler), off the west of Scotland (Heron-Allen and Earland), and from the Gulf of Mexico (Flint).

From the *Albatross* material I have had specimens from more than 20 stations ranging from Nova Scotia southward to the coast of South Carolina and 2 stations in the Gulf of Mexico eastward from the mouth of the Mississippi. These range in depth from 82 to 2,620 fathoms, the average being about 1,000 fathoms; bottom temperatures range from 34.4° to 40.6° F., with one station in the Gulf of Mexico in comparatively shallow water 51.6°. The average, however, is about 38° F.

Outside the Atlantic the species is recorded from the North and South Pacific (*Challenger*, Brady) and from off New Zealand (Chapman).

Pelosina variabilis—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom tom perature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
9730	U.S.N.M.	1	D2018....	37 12 22 N.; 74 20 04 W.	788	39	bu. m.......	Rare.
9731	U.S.N.M.	1	D2042....	39 33 00 N.; 68 26 45 W.	1,555	38.5	glob. oz.....	Rare.
9732	U.S.N.M.	4	D2046....	40 02 49 N.; 68 49 00 W.	407	40	bu. m.......	Rare.
9733	U.S.N.M.	2	D2097....	37 56 20 N.; 70 57 30 W.	1,917	....	glob. oz.....	Rare.
9734	U.S.N.M.	2	D2204....	39 30 30 N.; 71 44 30 W.	728	39.1	br. m.......	Rare.
9735	U.S.N.M.	2	D2205....	39 35 00 N.; 71 18 45 W.	1,073	38.1	gy. oz.......	Few.
9736	U.S.N.M.	2	D2112....	39 59 30 N.; 70 30 45 W.	428	40	gn. m.......	Rare.
9372	U.S.N.M.	2	D2222....	39 03 15 N.; 70 50 45 W.	1,537	36.9	gy. oz.......	Few.
9373	U.S.N.M.	1	D2226....	37 00 00 N.; 71 54 00 W.	2,045	36.8	glob. oz.....	Rare.
9374	U.S.N.M.	1	D2228....	37 25 00 N 73 06 00 W.	1,582	36.8	br. m.......	Rare.
9737	U.S.N.M.	1	D2383....	28 32 00 N.; 88 06 00 W.	1,181	39.8	br. gy. m....	Rare.
9375	U.S.N.M.	3	D2399....	28 44 00 N.; 86 18 00 W.	196	51.6	gy. m.......	Rare.
9376	U.S.N.M.	1	D2504....	44 23 00 N.; 61 22 45 W.	82	40.6	bk. m. g.....	Few.
9377	U.S.N.M.	2	D2531....	40 42 00 N.; 60 33 00 W.	852	34.4	gy. m.......	Rare.
9379	U.S.N.M.	2	D2552....	39 47 07 N.; 70 35 00 W.	721	39.6	gy. oz.......	Rare.
9378	U.S.N.M.	1	D2550....	39 44 30 N.; 70 30 45 W.	1,061	38.5	br. m.......	Rare.
9380	U.S.N.M.	1	D2564....	39 22 00 N.; 71 23 30 W.	1,390	37.3	gy. oz.......	Rare.
9381	U.S.N.M.	1	D2566....	37 23 00 N.; 68 08 00 W.	2,620	36.4	gy. oz.......	Rare.
9382	U.S.N.M.	2	D2571....	40 09 30 N.; 67 09 00 W.	1,356	37.8	gy. glob. oz..	Rare.
9738	U.S.N.M.	1	D2678....	32 40 00 N.; 76 40 30 W.	731	38.7	lt. gy. oz....	Rare.
9383	U.S.N.M.	2	D2716....	38 29 30 N.; 70 57 00 W.	1,631	....	br. oz. for ...	Rare.
9384	U.S.N.M.	1	D2729....	36 36 00 N.; 74 32 00 W.	679	....	dk. gy. m...	Rare.

PELOSINA CYLINDRICA H. B. Brady.

Plate 22, fig. 5.

Pelosina cylindrica H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 236, pl. 26, figs. 1–6.—Egger, Abh. bay. Akad. Wiss. München, vol. 18, 1893, p. 253, pl. 4, figs. 1, 2.—Rhumbler, Arch. Prot., vol. 3, 1903, p. 239, fig. 72 (in text).—Chapman, Trans. New Zealand Inst., vol. 38, 1905, p. 83.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 46, figs. 50, 51 (in text).—Pearcey, Trans. Roy. Soc. Edinburgh, vol. 49, 1914, p. 1002.

Rhizammina indivisa Goës (part), Bull. Mus. Comp. Zoöl., vol. 29, 1896, p. 20.

Description.—Test free, elongate, subcylindrical, straight or slightly curved, diameter nearly uniform, ends rounded; wall thick, composed of loosely aggregated shell fragments or foraminiferal tests with a base of fine mudlike material, outside irregular, rough, interior smoothly finished, with a chitinous lining; color dark gray varying to almost white, according to the character of the wall; aperture at one end, circular.

Length, up to 15mm.; diameter, about 2mm.

Distribution.—Most of the records for this species are from deep water. The *Challenger* material except at one station was from over a thousand fathoms. Two of these stations were in the Atlantic, off

Gomera, Canary Islands, 620 fathoms, and off Sierra Leone, 1,750 fathoms. I have had material from the *Albatross* dredgings from 10 stations, 7 of these from the region south of Cape Cod from off Long Island to the region south of Georges Banks and the other three stations from the Gulf of Mexico off the mouth of the Mississippi and off Yucatan.

The species is also known from Antarctic Ice Barrier (Brady, *Challenger*), east coast of New Zealand (Brady, Chapman), from the North Pacific (Brady, Goës, Cushman), from the Indian Ocean west of Australia (Egger), and from the Antarctic (Pearcey).

The species is somewhat variable in the character of the test wall according to the bottom conditions from which it takes the material for its building purposes.

Pelosina cylindrica—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
9724	U.S.N.M.	2	D2042....	39 33 00 N.; 68 26 45 W.	1,555	38.5	glob. oz.....	Few.
9723	U.S.N.M.	1	D2052....	39 40 05 N.; 69 21 25 W.	1,098	45	glob. oz.....	Few.
9725	U.S.N.M.	1	D2150....	13 34 45 N.; 81 21 10 W.	382	45.75	wh. crs. s...	Rare.
9726	U.S.N.M.	1	D2204....	39 30 30 N.; 71 44 30 W.	728	39.1	br. m.......	Rare.
9727	U.S.N.M.	1	D2208....	39 33 00 N.; 71 16 15 W.	1,178	38.4	gn. m.......	Rare.
9728	U.S.N.M.	7	D2383....	28 32 00 N.; 88 06 00 W.	1,181	39.8	br. gn. m....	Common.
9729	U.S.N.M.	2	D2385....	28 51 00 N.; 88 18 00 W.	730	40.1	gy. m.......	Few.
9869	U.S.N.M.	3	D2531....	40 42 00 N.; 66 33 00 W.	852	34.4	gy. m.......	Few.
9870	U.S.N.M.	2	D2581....	39 43 00 N.; 71 34 00 W.	394	....	gn. m.......	Rare.
9871	U.S.N.M.	2	D2713....	38 20 00 N.; 70 08 30 W.	1,859	....	br. oz.......	Rare.

PELOSINA ROTUNDATA H. B. Brady.

Plate 21, figs. 4–6.

Pelosina rotundata H. B. Brady, Quart. Journ. Micr. Sci., vol. 19, 1879, p. 31, pl. 3, figs. 4, 5; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 236, pl. 25, figs. 18–20.—Egger, Abh. bay. Akad. Wiss. München, vol. 18, 1893, p. 254, pl. 11, fig. 60.—Millett, Journ. Roy. Micr. Soc., 1899, p. 249, pl. 1, fig. 1.—Rhumbler, Arch. Prot., vol. 3, 1903, p. 239, fig. 71 (in text).—Chapman, Trans. New Zealand Inst., vol. 38, 1905, p. 83.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 45, figs. 47–49 (in text).

Description.—Test flask shaped or pyriform with an elongated tubular neck, which is often membranaceous, of brownish, chitinous material, continuous with the lining of the test, remainder of the wall thick, composed of foraminiferal tests or other coarse material with a ground mass of fine mud loosely cemented, interior smoothly finished with a brownish, chitinous lining extended to the apertural neck, chamber small compared to the size of the test on account of the thick wall, undivided; aperture at the end of the tubular neck, rounded.

Diameter, up to 2 mm.

Distribution —Records for this species are very rare. From the *Challenger* material Brady records it south of Rockall Bank in 640 fathoms and west of the Azores, 1,675 fathoms, and in the South Atlantic south of Pernambuco, Brazil, 350 fathoms. I have somewhat doubtful material from *Albatross* station D2212, in 428 fathoms, bottom temperature 40° southeast of Nantucket Shoals.

In other oceans it is known from the North Pacific (Brady) Malay Archipelago (Millett), Indian Ocean west of Australia (Egger) and off New Zealand (Chapman).

PELOSINA RECTA, new species.

Description.—Test free, elongate, the ends rounded, the sides nearly parallel, slightly tapering toward either end, compressed; wall of considerable thickness, composed for the most part of fine mud cemented together with a smooth surface, the interior also smooth, with a thin chitinous lining, somewhat yellowish in color; aperture at the end, rounded or somewhat elongate in the line of compression, without any trace of a neck, color grayish.

Length, up to 12 mm.; breadth, 3 mm.

Distribution.—Type-specimens from *Albatross* station D2084, in 1,290 fathoms (40°16′50″ N.; 67°05′15″ W.), bottom temperature 40°F. (Cat. No. 10001, U. S. N. M.). At this station several specimens all of this sort were found but none were found elsewhere. It is evidently a *Pelosina* from the construction of the test and its chitinous lining, but there is no neck and the opening is directly into the body of the chamber.

PELOSINA PARVA Rhumbler.

Plate 21, fig. 3.

Pelosina parva RHUMBLER, Foram. Plankton-Exped., pt. 1, 1909 (1911), pl. 1, fig. 3; pt. 2, 1913, p. 374.

Description.—Test bottle shaped with lower end broad and rounded, bent more or less like a half moon, sand grains sparsely laid in the wall; single grains protrude sharply like short spines over the wall.

Length, up to 1 mm.

Distribution.—Locality near St. Vincent, 4980 (J. No. 139), few, mostly broken, specimens.

This new form is the smallest of the known species of the genus, in the point of size the nearest is *P. rotundata* Brady (1.8 mm.), which is distinguished from it by a sharply defined flask-shaped pouch. It reminds one of the larger (12 mm.) *P. cylindrica* Brady.

PELOSINA ARBORESCENS Pearcey.

Plate 23, figs. 1, 2.

Pelosina arborescens PEARCEY, Trans. Roy. Soc. Edinburgh, vol. 49, 1914, p 1001, pl. 1, figs. 1–5.

This form was described by Pearcey as follows:

> Test vase shaped, elongate, subcylindrical, erect, smooth and unctous to the touch, more or less flexible in the living state, rounded at the base, gradually narrowing toward the superior extremity, which is drawn out into a slender main tubular chamber, somewhat dome shaped at its base.
>
> From about one-third of the test upward a number of dichotomous tubular branches extend at irregular intervals with graceful curves. These branches open out into the main chamber. The wall at the base of each outgrowth is thicker and somewhat swollen, but after a short distance becomes more uniform in diameter. Walls of the main chamber thick, composed of fine mud deposited on a slender chitinous envelope extending to the terminal apertures of the branching tubes where it becomes quite thin and consists of little more than a membrane, so thin and soft that it readily collapses on drying.
>
> Color vandyke brown. A few filamentous outgrowths come off from the outer wall of the extremity of the basal portion and appear in some cases to be tubular, but they are so fragile that they break off with the slightest manipulation. It is probable that these filaments serve to fix the test in an upright position in the deposit on the ocean floor.
>
> Height of test, 1¼–2 inches (30–48 mm.) or more.

Distribution.—Pearcey records this species from the west coast of Scotland, 50–90 fathoms, sparingly in the deep water area of Loch Fyne, 100–107 fathoms; off coast of Norway (Norman); and doubtful specimens collected by the *Triton* in 640 fathoms in the Faroe Channel.

This is a most interesting species in many ways and is probably widely distributed, as Pearcey also records it from the Antarctic in deep water, 2,620 fathoms.

Genus HIPPOCREPINA Parker, 1870.

Hippocrepina Parker, in Dawson, Can. Nat., n. ser., vol. 5, 1870, p. 176 (type, *H. indivisa* Parker).—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 324.—Rhumbler, Arch. Prot., vol. 3, 1903, p. 274.

Description.—Test free, consisting of a single, elongate, somewhat tapering, straight or slightly curved chamber, closed at the somewhat bluntly pointed proximal end, distal end broad and rounded, walls comparatively thin, of fine sand grains with a reddish-brown cement, grayish toward the distal end; aperture curved, narrow, or irregular, sometimes with a raised lip.

The genus seems to be rare but the records are rather widely scattered, Heron-Allen and Earland having described a species from the Kerimba Archipelago off the southwestern coast of Africa and the type-species known from the North Atlantic.

HIPPOCREPINA INDIVISA Parker.

Plate 23, figs. 3–7.

Hippocrepina indivisa Parker, in Dawson, Can. Nat., n. ser., vol. 5, 1870, p. 176, fig. 2.—Dawson, Amer. Journ. Sci., ser. 3, vol. 1, 1871, p. 206, fig. 2; Ann. Mag. Nat. Hist., ser. 4, vol. 7, 1871, p. 86, fig. 2.—H. B. Brady, Ann. Mag.

Nat. Hist., ser. 5, vol. 8, 1881, p. 407, pl. 21, figs. 3*a*, *b*, 4; Denkschr. k. Akad. Wiss. Wien, vol. 43, pt. 2, 1881 (1882), p. 100, pl. 2, figs. 3*a*, *b*, 4; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 325, pl. 26, figs. 10–14.—Goës, Köngl. Svensk. Vet. Akad. Handl., vol. 25, No. 9, 1894, p. 28, pl. 6, figs. 216, 217.—SCHLUMBERGER, Mem. Soc. Zool. France, vol. 7, 1894, p. 253.—RHUMBLER, Arch. Prot., vol. 3, 1903, p. 274, fig. 124 (in text).—HERON-ALLEN and EARLAND, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 48, pl. 2, figs. 10, 11.

The original description was as follows:

> Test free, monothalamous; elongate, straight, or somewhat curved; superior or oral end broad and rounded; inferior tapering to a blunt point and closed. Aperture a wide curved slit, often irregular, set in a raised collar in the center of the broad end of the test. Walls thin and finely arenaceous; color reddish brown at the point, lighter toward the oral end.
>
> Length, about one twenty-fifth inch (1 mm.).

Distribution.—From the available records this seems to be a species of very cold waters. Its type station is Gaspé Bay, at the mouth of the St. Lawrence River, 16–20 fathoms (Dawson). It has been recorded from Holsteinborg Harbor, Greenland, 10 fathoms (Norman), and from soundings in the Matyushin Shar, Novaya Zembya, 10–15 fathoms (Brady), and from the Bay of Kola (Schlumberger). A single specimen is known from the British Isles in the Clare Island region, Ireland (Heron-Allen and Earland).

The only material I have seen at all referable to this species is from *Albatross* station D2018, off the eastern coast of the United States in 788 fathoms, bottom temperature 39.0° F. (U.S.N.M. No. 9681). Heron-Allen and Earland speak of their Clare Island specimen as "light gray in color and metallic in luster, due probably to the use of minute flakes of mica in the construction of the test."

The material I have from D2018 has also a very silvery surface, which was noted at the time the specimen was first found.

Genus TECHNITELLA Norman, 1878.

Technitella NORMAN (type, *T. legumen* Norman), Ann. Mag. Nat. Hist., ser. 5, vol. 1, 1878, p. 279.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 245.—RHUMBLER, Arch. Prot., vol. 3, 1903, p. 256.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 47.—HERON-ALLEN and EARLAND, Journ. Roy. Micr. Soc., 1912, p. 382.—PEARCEY, Trans. Roy. Soc. Edinburgh, vol. 49, 1914, p. 1002.

Description.—Test free, usually elongate, subcylindrical, fusiform or elongate oval, consisting of a single chamber; wall thin, composed of sponge spicules and fine sand, aperture rounded at the open end of the test.

As far as records show the various species of *Technitella* are widely scattered, but do not occur in any considerable numbers. As shown by Heron-Allen and Earland for *T. legumen* the test in that species at least is composed of two definite layers of spicules, those of the exterior longitudinally placed, those of the interior transversely, giving a test of great rigidity.

TECHNITELLA LEGUMEN Norman.

Plate 9, figs. 1, 2; plate 10, fig. 1; plate 16, figs. 7, 8; plate 24, figs. 3–5; plate 26, fig. 5.

Technitella legumen NORMAN, Ann. Mag. Nat. Hist., ser. 5, vol. 1, 1878, p. 279, pl. 16, figs. 3, 4.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 246, pl. 25, figs. 8–12.—GOËS, Köngl. Svensk. Vet. Akad. Handl., vol. 25, No. 9, 1894, p. 14, pl. 3, figs. 20–27.—RHUMBLER, Arch. Prot., vol. 3, 1903, p. 256, fig. 96 (in text).—DAKIN, Rep. Ceylon Pearl Oyster Fish., vol. 5, 1906, p. 232.—HERON-ALLEN and EARLAND, Journ. Quekett Micr. Club, ser. 2, vol. 10, 1909, pp. 406, 408, 412, pl. 34, fig. 10.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 47, fig. 53 (in text).—HERON-ALLEN and EARLAND, Journ. Roy. Micr. Soc., 1912, p. 382, pl. 5, figs. 1, 2; pl. 6, fig. 1; Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 37.—CHAPMAN, Zool. Results *Endeavour*, vol. 3, pt. 1, 1915, p. 13.

Description.—Test free, usually elongate, pyriform, subcylindrical, fusiform or elongate oval, consisting of a single undivided chamber; wall thin, composed of sponge spicules and fine sand or amorphous white material, the spicules usually whole and of nearly the same size, those of the interior arranged transversely, those of the exterior longitudinally; aperture rounded, at the smaller end of the test, usually without a definite neck; color usually pure white, sometimes grayish.

Length, up to 2.5 mm.

Distribution.—Although widely distributed this species never seems to occur in any great numbers. The Atlantic records consist of the following: South of Bukken, Norway, 150–300 fathoms; 30 miles west of Valentia, Ireland, 112 fathoms (Norman); off Cumbrae, 60–65 fathoms (Robertson); North Sea and off Clare Island, Ireland (Heron-Allen and Earland); coast of Sweden (Goës); south of Pernambuco, Brazil, 350 fathoms; and east of Buenos Ayres, 1,900 fathoms (Brady). Outside the Atlantic it is known from off Christmas Harbor, Kerguelen Islands, 120 fathoms; off Sydney, New South Wales, 410 fathoms; north of the Society Islands, 2,350 fathoms; off the Fiji Islands and east of Japan, 1,875 fathoms (Brady); Gulf of Manaar (Dakin); and east of Tasmania, 1,122 fathoms (Chapman).

The specimens from the Malay Archipelago figured by Millett are referred to *Nouria harrisii* by Heron-Allen and Earland, who examined Millett's specimens.

The structure made by the two sets of spicules at right angles to one another is very strong. The details of the structure are given by Heron-Allen and Earland, but it is worthy of note that Goës in 1894 in his figures, especially figure 26, where the interior is shown, made out this same structure. In the figure referred to the spicules on the interior are horizontal, those of the exterior vertical.

In all the *Albatross* material I have examined the species has occurred at but three stations. These were of the typical elongate form figured by Brady. It is of interest that Flint does not record the species in his work on the *Albatross* material, showing with the few records I have been able to secure, that it is certainly rare on this side of the Atlantic so far as this material shows. The specimens from D2205 are very white and the material of which they are composed is very fine, at least on the surface, which is coated with a thin coating of fine amorphous material in most specimens. In only one of the specimens is there a coating of sand grains. Except in this last specimen, the spicules of the surface are entirely concealed by the fine white coating similar to that seen in *Pilulina jeffreysii*.

Technitella legumen—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
9893	U.S.N.M.	1	D2052....	39 40 05 N.; 69 21 25 W.	1,098	45	glob. oz.....	Rare.
9894	U.S.N.M.	2	D2205....	39 35 00 N.; 71 18 45 W.	1,073	38.1	gy. oz.......	Rare.
9515	U.S.N.M.	2	D2550....	39 44 30 N., 70 30 45 W.	1,081	38.5	br. m.......	Rare.

TECHNITELLA MELO Norman.

Plate 16, fig. 6.

Technitella melo NORMAN Ann. Mag. Nat. Hist., ser. 5, vol. 1, 1878, p. 280, pl. 16, figs. 5, 6.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 246, pl. 25, figs. 7*a*, *b*.—CHAPMAN, Proc. Zool. Soc. London, 1895, p. 12.—RHUMBLER, Arch. Prot., vol. 3, 1903, p. 256, figs. 95*a*, *b* (in text).—HERON-ALLEN and EARLAND, Journ. Quekett Micr. Club, ser. 2, vol. 10, 1909, pl. 34, fig. 9.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 48, fig. 54 (in text).

Description.—Test free, oval, slightly fusiform and tapering at the ends, with a single undivided chamber wall composed almost entirely of sponge spicules longitudinally placed and firmly united with a whitish cement; aperture small, terminal, circular, occasionally with a slight neck; color white or grayish.

Length, 1.4 mm.; diameter, 1 mm.

Distribution.—This species is even more rare than the preceding. In the Atlantic it is known from south of the Rockall Bank, 1,215 fathoms (Norman); Gulf of Gascony (Rhumbler); South Atlantic, *Challenger* station 344, off Ascension Island, 420 fathoms (Brady). Outside it is known from the Laccadives, Arabian Sea (Chapman), and *Challenger* station 237, in 1,875 fathoms, east of Japan (Brady).

This is a very scattered distribution, the small size and apparent rarity at any particular station being sufficient to account for the few records.

TECHNITELLA THOMPSONI Heron-Allen and Earland.

Plate 24, figs. 1, 2.

Technitella thompsoni Heron-Allen and Earland, Journ. Quekett Micr. Club, ser. 2, vol. 10, 1909, p. 403, pls. 31, 32, 34, fig. 8.

This species is described as follows:

> Test free, subcylindrical, rounded and slightly tapering at one extremity and bluntly truncate at the other, consisting of a hollow chamber with composite walls built up entirely of echinoderm plates in a more or less perfect condition. The plates which overlap each other are fastened together without visible cement. No special aperture at either end of the test, the extremities being closed by means of similar plates set at an angle so that they resemble the incurving petals of a flower. Surface of the test neat and regular, and entirely devoid of extraneous matter, but the projecting edges of the flat (or slightly curved) plates used in the construction of the test give a somewhat irregular or serrate appearance to the outline. Hyaline-white in appearance, with slight iridescence when dry, due apparently to diffraction effects caused by the film of chitin with which the separate plates are probably fastened together.
>
> Length, 1.8 mm.; breadth at truncate extremity, 0.350 mm., widening to 0.4 mm., and again diminishing somewhat rapidly to 0.250 mm. at the tapering extremity.

Distribution.—This very interesting species was first obtained by the *Goldseeker* in Moray Firth in 33 fathoms (station 8, 57° 55′ N.; 3° 20′ W.), and another specimen was later obtained in the North Sea in 39.71 fathoms (station 41C, 56° 35′ N.; 0° 10′ W.).

The selective power of this species in choosing only the plates of echinoderms from the mass of the bottom material is very interesting. As the selective power is so striking, some of the notes of the authors are here given:

> As illustrating the skill of *Technitella thompsoni* and the great selective power exhibited by the animal, it may be stated that in neither of the dredgings in which it has been found do echinoderm plates, such as are used in its construction, abound. They occur in considerable numbers, as always is the case of shallow-water dredgings, but they form an infinitesimal percentage of the material as dredged, and their presence would be almost unobserved unless especially searched for.

Genus WEBBINELLA Rhumbler, 1903.

Webbina Jones, Parker, and H. B. Brady (type, *Webbina hemisphaerica* Jones, Parker, and H. B. Brady), Pal. Soc. Mon., 1865, p. 27 (not *Webbina* d'Orbigny, 1839).—H. B. Brady (part), Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 348.—Chapman, Ann. Mag. Nat. Hist., ser. 6, vol. 18, 1896, p. 326.

Psammosphaera Eimer and Fickert (part), Zeitschr. Wiss. Zool., vol. 65, 1899, p. 671.

Webbinella Rhumbler (part), Arch. Prot., vol. 3, 1903, p. 228.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 50.

Description.—Test fixed, circular in outline, the central portion convex, the peripheral portion often forming a flattened flangelike rim about the central portion; chamber single, undivided, wall of medium thickness, composed of fine sand grains with a large proportion of cement rather smoothly finished both without and within;

aperture not apparent, the pseudopodia being thrust out at the basal portion of the test near the surface of attachment.

As now used this genus includes only the following species. In the genus *Ammolagena* is placed *A. clavata*, which seems to have practically no characters in common with *W. hemisphaerica*. *Ammolagena* has a definite second tubular chamber and a definite aperture.

WEBBINELLA HEMISPHAERICA (Jones, Parker, and H. B. Brady).

Plate 25, figs. 1-3.

Webbina hemisphaerica Jones, Parker, and H. B. Brady, Pal. Soc. Mon., 1865, p. 27, pl. 4, fig. 5.—Robertson, Rep. Brit. Ass., 1875, p. 189.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 350, pl. 41, fig. 11.—Egger, Abh. bay. Akad. Wiss. München, vol. 18, 1893, p. 266, pl. 14, figs. 1-3.—Cushman, Proc. Boston Soc. Nat. Hist., vol. 34, 1908, p. 24.—Heron-Allen and Earland, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 53.

Placopsilina bulla Goës (part), Köngl. Svensk. Vet. Akad. Handl., vol. 25, No. 9, 1894, p. 28, pl. 6, figs. 211, 212 (not figs. 213-215).

Psammosphaera hemisphaerica Eimer and Fickert, Zeitschr. Wiss. Zool., vol. 65, 1899, p. 671.

Webbinella hemisphaerica Rhumbler, Arch. Prot., vol. 3, 1903, p. 228, fig. 54 (in text).—Cushman, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 51, figs. 56*a*, *b* (in text).—Pearcey, Trans. Roy. Soc. Edinburgh, vol. 49, 1914, p. 1003.

Description.—Test fixed, circular in outline when viewed from above, central portion convex, surrounded by a flattened flangelike border of varying width but sometimes entirely absent, chamber single, undivided, wall composed of fine sand grains with a very large proportion of cement, nearly smooth outside, smoothly finished within or occasionally roughened if there is an excess of sand; aperture indefinite, the pseudopodia being thrust through near the base just above the attachment; color usually grayish white, sometimes light brown.

Diameter, 0.5-1.5 mm.

Distribution.—Heron-Allen and Earland suggest that the apparent rarity of this species is due to the fact that it usually occurs in coarse shell sand or gravel containing few other Foraminifera. On the western side of the Atlantic such bottom conditions obtain where the species occurs. It has been noted from eight *Albatross* stations ranging in depth from 159 to 2,620 fathoms, with the average about 1,000 fathoms, bottom temperatures ranging from 36.4° at the deepest station to 47.4°F. at the shallowest. These *Albatross* stations are all south of Cape Cod, three southeast of Cape Cod, one off New Jersey, three off South Carolina, and the other in the Caribbean Sea north of Panama. I have recorded it from shallow water in the Woods Hole region. On the other side of the Atlantic it is known from the Faroe Channel, from the North Sea coast of England off Durham, from the Clare Island region, west of Ireland, and from off the Cape Verde Islands. Pearcey records it from the Antarctic in

2,621 fathoms, Heron-Allen from the Hauraki Gulf in New Zealand, and I have recorded it from the northwest Pacific.

It seems, therefore, to be a widely distributed species and probably overlooked, as Heron-Allen and Earland suggest.

Webbinella hemisphaerica—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
9903	U.S.N.M.	1	D2048....	40 02 00 N.; 68 50 30 W.	547	39?	crs. m. g....	Rare.
9904	U.S.N.M.	1	D2105....	37 50 00 N.; 73 03 50 W.	1,917	....	glob. oz.....	Rare.
9905	U.S.N.M.	1	D2150....	13 34 45 N.; 81 21 10 W.	382	45.75	wh. crs. s....	Rare.
9529	U.S.N.M.	2	D2314....	32 43 00 N.; 77 51 00 W.	159	47.4	crs. s. bk. sp. brk. sh.	Rare.
9530	U.S.N.M.	1	D2566....	37 23 00 N.; 68 08 00 W.	2,620	36.4	gy. oz.......	Rare.
9908	U.S.N.M.	10+	D2624....	32 36 00 N.; 77 29 15 W.	258	....	gy. s. bk. sp.	Common.
9917	U.S.N.M.	10+	D2625....	32 35 00 N.; 77 30 00 W.	247	....	gy. s. bk. sp.	Common.
9531	U.S.N.M.	1	D2716....	38 29 30 N.; 70 57 00 W.	1,631	....	br. oz. for...	Rare.

Genus THOLOSINA Rhumbler, 1895.

Placopsilina H. B. Brady (type *Placopsilina bulla* (H. B. Brady)) (part), Quart. Journ. Micr. Soc., vol. 19, 1879, p. 51; vol. 21, 1881, p. 51; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 314.

Tholosina Rhumbler, Nachr. Köngl. Ges. Wiss. Göttingen, 1895, p. 82; Arch. Prot., vol. 3, 1903, p. 226.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 49.—Awerinzew, Mem. Acad. Imp. Sci. St. Petersburg, ser. 8, vol. 29, No. 3, 1911, p. 8.—Pearcey, Trans. Roy. Soc. Edinburgh, vol. 49, 1914, p. 1002.

Pseudoplacopsilina Eimer and Fickert, Zeitschr. Wiss. Zool., vol. 65, 1899, p. 672.

Description.—Test attached, hemispherical, flattened on the side by which it is attached, chamber single, undivided; with pseudopodial extensions of the test along the surface of the attached surface or with the sides clear cut; wall of fine sand grains with a large proportion of calcareous cement; pseudopodial openings at base along attachment or at the end of irregular tubes running out from the base along the surface of attachment.

Of the two species *T. bulla* is usually attached to other arenaceous foraminifera in fairly deep water, while *T. vesicularis* is more often attached to pebbles or rocks in much shallower water.

THOLOSINA BULLA (H. B. Brady).

Plate 25, fig. 6.

Placopsilina bulla H. B. Brady, Quart. Journ. Micr. Soc., vol. 21, 1881, p. 51; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 315, pl. 35, figs, 16, 17.—Goës, Köngl. Svensk. Vet. Akad. Handl., vol. 25, No. 9, 1894, p. 28, pl. 6, figs. 213–215 (not figs. 211, 212=*Ammolagena*); Bull. Mus. Comp. Zoöl., vol. 29, 1896, p. 25.—Millett, Journ. Roy. Micr. Soc., 1899, p. 361, pl. 5, fig. 11.

Tholosina bulla Rhumbler, Nachr. Köngl. Ges. Wiss. Gottingen, 1895, p. 82.—Kiaer, Norske Nordhavs Expedition, No. 25, 1899, p. 4.—Rhumbler, Arch. Prot., vol. 3, 1903, p. 227, fig. 52 (in text).—Cushman, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 49, fig. 55 (in text).—Pearcey, Trans. Roy. Soc. Edinburgh, vol. 49, 1914, p. 1002.

Pseudoplacopsilina bulla Eimer and Fickert, Zeitschr. Wiss. Zool., vol. 65, 1899, p. 672.

Description.—Test adherent, hemispherical or at least strongly convex, base flattened or irregular to conform to the surface to which it is attached; on a narrow base the test is usually somewhat elongate in the direction of the length of the attachment; chamber single, usually undivided; wall thick, composed of sand grains or fine amorphous material with much calcareous cement, outer surface somewhat uneven, interior fairly smooth aperture simple, circular elliptical or crescentiform, one or two, at either end near the base; color grayish white.

Diameter, not usually exceeding 1 mm.

Distribution.—Two Atlantic stations are given in the *Challenger* Report *Porcupine* station 19, in 1,366 fathoms, west of the North of Ireland, and from a *Challenger* station, in 1,900 fathoms, east of Buenos Aires. Goës records it from the Skagerack in 160 to 530 meters attached to *Rhabdammina* and from the Koster Islands at 18–140 meters attached to Fucus. Under this name, however, Goës includes, or at least his figures include *Ammolagena clavata*, so these records are somewhat obscure without recourse to original material. Kiaer records it from the subarctic region. The species occurs more abundantly on the Pacific coast of America, especially off the Central American and Mexican coasts (Goës, Cushman), and it is known from off the Pacific coast of Chile (Brady); Malay Archipelago (Millett), off Japan (Cushman), and from the Antarctic Pearcey).

When attached to a more or less regular surface of different color like the cylindrical reddish tubes of *Rhabdammina* this becomes a conspicuous object by its difference in color and changing the contour line of the surface to which it is attached. When attached to other light-colored bases, however, it is not easily seen. There is a tendency to division in some of the chambers.

In the *Albatross* material I have examined it has occurred at 20 stations between the Grand Banks and Cape Hatteras, depths ranging from 82 to 2,620 fathoms, bottom temperatures from 36.4° to 40.6° F. Most of these are attached to the *Rhabdammina* but are never in any considerable numbers at any station.

Tholosina bulla—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°*F.*		
9895	U.S.N.M.	1	D2046....	40 02 49 N.; 68 49 00 W.	407	40	bu. m.......	Rare.
9896	U.S.N.M.	2	D2097....	37 56 20 N.; 70 57 30 W.	1,917	....	glob. oz.....	Rare.
9897	U.S.N.M.	1	D2115....	35 49 30 N.; 74 34 45 W.	843	39	m. fine s....	Rare.
9898	U.S.N.M.	2	D2171....	37 59 30 N.; 73 48 40 W.	444	39.5	gn. m.......	Rare.
9899	U.S.N.M.	1	D2172....	38 01 15 N.; 73 44 00 W.	568	39	gn. m.......	Rare.
9900	U.S.N.M.	3	D2187....	39 49 30 N.; 71 10 00 W.	420	37.7	gn. m. s.....	Few.
9901	U.S.N.M.	2	D2203....	39 34 15 N.; 71 41 15 W.	705	38.9	gn. m. s.....	Rare.
9902	U.S.N.M.	1	D2213....	39 58 30 N.; 70 30 00 W.	384	39.5	gn. m.......	Rare.
9518	U.S.N.M.	1	D2221....	39 05 30 N.; 70 44 30 W.	1,525	36.9	gy. oz.......	Rare.
9519	U.S.N.M.	3	D2234....	39 09 00 N.; 72 03 15 W.	810	38.6	gn. m.......	Few.
9520	U.S.N.M.	4	D2237....	39 12 17 N.; 72 09 30 W.	520	39.5	gn. m.......	Few.
9521	U.S.N.M.	4	D2504....	44 23 00 N.; 61 22 45 W.	82	40.6	bk. m. g.....	Few.
9522	U.S.N.M.	10+	D2547....	39 54 30 N.; 70 20 00 W.	390	39.6	gn. m.......	Common.
9906	U.S.N.M.	1	D2533....	40 16 30 N.; 67 26 15 W.	828	38.7	br. oz.......	Rare.
9523	U.S.N.M.	1	D2562....	39 15 30 N.; 71 25 00 W.	1,434	37.3	gy. oz.......	Rare.
9524	U.S.N.M.	2	D2566....	37 23 00 N.; 68 08 00 W.	2,620	36.4	gy. oz.......	Few.
9525	U.S.N.M.	3	D2696....	46 53 30 N.; 45 05 30 W.	98	....	gy. s. bk. sp.	Few.
9526	U.S.N.M.	3	D2716....	38 29 30 N.; 70 57 00 W.	1,631	....	br. oz: for...	Few.
9527	U.S.N.M.	3	D2729....	36 36 00 N.; 74 32 00 W.	679	....	dk. gy. m...	Few.
9528	U.S.N.M.	1	D2731....	36 45 00 N.; 74 28 00 W.	781	....	gy. oz.......	Rare.

THOLOSINA VESICULARIS (H. B. Brady).

Placopsilina vesicularis H. B. Brady, Quart. Journ. Micr. Sci., vol. 19, 1879, p. 51, pl. 5, fig. 2; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 316, pl. 35, figs. 18, 19.—Heron-Allen and Earland, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 47.

Tholosina vesicularis Rhumbler, Arch. Prot., vol. 3, 1903, p. 227, fig. 53 (in text).—Awerinzew, Mem. Acad. Imp. Sci. St. Petersburg, ser. 8, vol. 29, No. 3, 1911, p. 8.

Description.—Test attached, lower side flattened or conforming to the surface to which it is attached, more or less irregular but in general a convex, low arching, subcircular chamber with the borders extending out into simple or branching generally tubular extensions for the pseudopodia, no other openings apparent; wall composed of sand grains embedded in an excess of cement, the grains usually angular and scattered so that they are separate from one another, surface smooth both without and within; chambers sometimes connected by the pseudopodal extensions or often crowded together, appearing to be a fusion or accidental placement rather than a direct association of several chambers of one individual; color light gray.

Diameter, up to 3 or 4 mm. without the pseudopodal extensions.

Distribution.—The material described by Brady came from three *Porcupine* stations between the northwest of Ireland and the Rockall Bank, depths 630, 1,215, and 1,443 fathoms. Beside these the *Challenger* obtained it east of Buenos Aires in 1,900 fathoms.

Awerinzew gives the following stations in the Siberian Arctic: North of New Siberian Islands, 38 meters, 77° 20′ 30″ N.; 138° 47′ E.; in 35 meters, 77° 10′ N.; 142° 48′ E.; and near Bennett Island, 42 meters, 76° 37′ N.; 147° 27′ E. These, it will be noted, are in cold, shallow water.

Heron-Allen and Earland in their Clare Island report give the following:

> A few small and somewhat obscure specimens from station 27 [18 fathoms]. The occurrence of this species in such shallow water is very noticeable. The *Challenger* records, which, with one exception, were from the northwest of Ireland, range between 630 and 1,443 fathoms. The species is extremely abundant attached to stones and other foraminifera at many of the *Goldseeker* stations in the Shetland-Faroe Channel, often at depths considerably less than the *Porcupine* and *Challenger* records.

The foregoing is interesting in comparison with conditions on the western Atlantic coast. In ordinary dredgings, especially the fine sifted material, the species is not met with. However, in going over the rock material in the United States National Museum it became apparent that this is one of our most abundant species at least on our New England coast and on the various banks. The smaller glacial pebbles are often literally covered with masses of the tests of *T. vesicularis* and on the dark-colored rocks they stand out in beautiful contrast. In the *Speedwell, Fish Hawk,* and *Albatross* rock material the species was found as far south as off Cape Hatteras, depths ranging down to 1,309 fathoms, and northward as far as the material is represented to the north of Newfoundland.

In the northern waters it is very common at shallow depths. In my own dredgings I have found it very abundant in Casco Bay and Penobscot Bay on the coast of Maine in a few fathoms of water or, in fact, in a few feet below low tide wherever the rocks are not covered either with barnacles or with rock weed.

In spite of its apparent rarity elsewhere except in the colder waters about the British Isles, this is probably a very abundant species in cold water. Awerinzew's records in the Arctic tend to show that it is widely distributed and its apparent absence may be due to the fact that many students of the foraminifera have not had the opportunity to examine the coarser material from cold water.

Tholosina vesicularis—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temporature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°*F.*		
9907	U.S.N.M.	10+	D2012	36 41 15 N.; 74 39 50 W.	66½			Common.
9914	U.S.N.M.	10+	D2074	41 43 00 N.; 65 21 50 W.	1,309	40	m. & st.	Common.
9918	U.S.N.M.	10+	D2109	35 14 20 N.; 74 59 10 W.	142	50.5	bu. m.	Common.
9913	U.S.N.M.	10+	D2456	47 29 00 N.; 52 18 00 W.	86		g.	Common.
			Speedwell.					
9909	U.S.N.M.	10+	5	42 28 00 N.; 70 42 00 W.	33	45?	s. & m.	Common.
9915	U.S.N.M.	10+	75	Sandwich Point, Halifax Harbor.			fne. s. & r.	Common.
9911	U.S.N.M.	10+	161	Off Cape Ann, S. E.	54			Common.
9910 9923	U.S.N.M.	10+	181	42 24 00 N.; 70 36 00 W.	45	41.5	m.	Common.
9912	U.S.N.M.	10+	219	42 30 00 N.; 70 33 00 W.	32	55.5	rky.	Common.
9916	U.S.N.M.	10+	236	42 28 00 N.; 70 31 00 W.	28	48.5	rky. crs. s.	Common.
			Fish Hawk					
9920	U.S.N.M.	10+	776					Common.

Genus CRITHIONINA Goës, 1894.

Crithionina Goës (type, *C. mamilla* Goës) Köngl. Svensk. Vet. Akad. Handl., vol. 25, No. 9, 1894, p. 14; Bull. Mus. Comp. Zoöl., vol. 29, 1896, p. 24.—Rhumbler, Arch. Prot., vol. 3, 1903, p. 229.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 53.—Heron-Allen and Earland, Trans. Linn. Soc. London, vol. 11, pt. 13, 1916, p. 219.

Description.—Test spherical, lenticular or variously shaped, interior either labyrinthic or with a single chamber, apertures small and scattered or indistinct, wall thick, composed of sponge spicules or very fine sand, often chalky in appearance.

The especial development of this genus seems to be in the colder waters, especially in the North Atlantic, where in the colder waters it occurs in immense numbers. There are several species.

CRITHIONINA MAMILLA Goës.

Plate 27, figs. 1, 2; plate 28, fig. 12.

Crithionina mamilla Goës, Köngl. Svensk. Vet-Akad. Handl., vol. 25, No. 9, 1894. p. 15, pl. 3, figs. 34–36.—Schaudinn, Bergens Mus. Aarbog, 1894–95 (1896) No. 9, p. 4.—Millett, Journ. Roy. Micr. Soc., 1899, p. 250, pl. 4, fig. 2.—Rhumbler, Arch. Prot., vol. 3, 1903, p. 230, fig. 56 (in text).—Heron-Allen and Earland, Journ. Roy. Micr. Soc., 1913, p. 9, pl. 3; Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 40; Trans. Zool. Soc. London, vol. 20, 1915, p. 616; Trans. Linn. Soc. London, vol. 11, pt. 13, 1916, p. 219.

Description.—Test free or attached, comparatively large, very thick walled, central chamber small, connected with the surface by irregular channels; wall composed of fine sandy material, loosely agglutinated, very thick, surface irregular but fairly smooth, interior more granular; apertures small and inconspicuous; color a dirty gray; outer surface often cracked in drying.

Diameter, up to 4 mm.

Distribution.—Goës originally described this species from the Skagerack in 106 meters attached to dead eelgrass, *Zostera*. Schaudinn records it from off Bergen, Norway. Heron-Allen and Earland record it from a large number of stations in the North Sea, Faroe Channel, and also in the Clare Island region and west of Scotland. It is a very common species along our coast from the Newfoundland Banks southward to Cape Hatteras.

Crithionina mamilla—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		° *F.*		
9636	U.S.N.M.	10+	D2084	40 16 50 N.; 67 05 15 W.	1,290	40	bu. m. s.....	Common.
9637	U.S.N.M.	5	D2096	39 22 20 N.; 70 52 20 W.	1,451	37.5	gy. oz.......	Few.
9533	U.S.N.M.	2	D2229	37 38 40 N.; 73 16 30 W.	1,423	37.7	glob. oz.....	Common.
9277	U.S.N.M.	8	D2544	40 01 45 N.; 70 24 00 W.	131	47.7	gn. s. bk. sp.	Few.
9534	U.S.N.M.	10+	D2571	40 09 30 N.; 67 09 00 W.	1,356	37.8	gy. glob. oz.	Common.
9535	U.S.N.M.	3	D2716	38 29 30 N.; 70 57 00 W.	1,631	....	br. oz. for...	Few.

CRITHIONINA PISUM Goës.

Plate 25, figs. 4, 5; plate 26, figs. 1-3.

Crithionina pisum Goës, Bull. Mus. Comp. Zoöl., vol. 29, 1896, p. 24, pl. 2, figs. 1, 2.—Millett, Journ. Roy. Micr. Soc., 1899, p. 250, pl. 4, fig. 3.—Flint, Rep. U. S. Nat. Mus., 1897 (1899), p. 266, pl. 6, fig. 1.—Rhumbler, Arch. Prot., vol. 3, 1903, p. 230, fig. 57 (in text).—Heron-Allen and Earland, Journ. Quekett Micr. Club, ser. 2, vol. 10, 1909, pl. 34, figs. 6, 6*a*.

Crithionina abyssorum (part) Kiaer, Norske Nordhavs, Expedition, No. 25, 1899, p. 7, pl. 1, fig. 2 (not 1, 3, 4).

The original description is as follows:

Usually globular or subglobular, with comparatively smooth surface, often here and there provided with irregular impressions; wall thick, obsoletely sub-cavernous; traces of septa very obsolete; texture very loose, chalky, homogeneous; color whitish or gray.

Diameter, 1-3 mm.

Distribution.—The type station for this species is *Albatross* D2384, in 940 fathoms, in the northern part of the Gulf of Mexico. Flint records it from four *Albatross* stations south of Marthas Vineyard and Block Island (D2584, 2586, 2221, 2234), with a range of depth from 328 to 1,525 fathoms. In the *Albatross* material I have examined it has occurred sparingly from Georges Bank southward to Cape Hatteras.

Crithionina pisum—material examined.

Cat. No.	Çoll of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		° F.		
9688	U.S.N.M.	10+	D2084	40 16 50 N.; 67 05 15 W.	1,290	40	bu. m. s.	Abundant.
9630	U.S.N.M.	2	D2115	35 49 30 N.; 74 34 45 W.	843	39	m. fine s.	Rare.
9631	U.S.N.M.	10+	D2172	38 01 15 N.; 73 44 00 W.	568	39	gn. m.	Common.
9632	U.S.N.M.	4	D2208	39 33 00 N.; 71 16 15 W.	1,178	38.4	gn. m.	Few.
9633	U.S.N.M.	10+	D2213	39 58 30 N.; 70 30 00 W.	384	39.5	gn. m.	Few.
9278	U.S.N.M.	6	D2221	39 05 30 N.; 70 44 30 W.	1,525	36.9	gy. oz.	Rare.
9532	U.S.N.M.	10+	D2229	37 38 40 N.; 73 16 30 W.	1,423	37.7	glob. oz.	Few.
9279	U.S.N.M.	10+	D2234	39 09 00 N.; 72 03 15 W.	810	38.6	gn. m.	Common.
9280	U.S.N.M.	10+	D2237	39 12 17 N.; 72 09 30 W.	520	39.5	gn. m.	Few.
9634	U.S.N.M.	4	D2384	28 45 00 N.; 88 15 30 W.	940	39.6	br. gy. m.	Few.
9281	U.S.N.M.	10+	D2504	44 23 00 N.; 61 22 45 W.	82	40.6	bk. m. g.	Common.
9289	U.S.N.M.	10+	D2547	39 54 30 N.; 70 20 00 W.	390	39.6	gn. m.	Few.
9282	U.S.N.M.	1	D2552	39 47 07 N.; 70 35 00 W.	721	39.6	gy. oz.	Few.
9536	U.S.N.M.	7	D2571	40 09 30 N.; 67 09 00 W.	1,356	37.8	gy. glob. oz.	Few.
9283	U.S.N.M.	10+	D2680	39 50 00 N.; 70 26 00 W.	555			Few.
9284	U.S.N.M.	8	D2689	39 42 00 N.; 71 15 30 W.	525		gn. m.	Few.
9285	U.S.N.M.	10+	D2714	38 22 00 N.; 70 17 30 W.	1,825		br. oz.	Few.
9286	U.S.N.M.	1	D2716	38 29 30 N.; 70 57 00 W.	1,631		br. oz. for.	Rare.
9287	U.S.N.M.	10+	D2229	36 36 00 N.; 74 32 00 W.	679		dk. gy. m.	Few.
9288	U.S.N.M.	10	D2731	36 45 00 N.; 74 28 00 W.	781		gy. oz.	Few.

CRITHIONINA PISUM Goës, var. HISPIDA Flint.

Plate 26, fig. 4.

Crithionina pisum Goës, var. *hispida* Flint, Rep. U. S. Nat. Mus., 1897 (1899), p. 267, pl. 6, fig. 2.—Rhumbler, Arch. Prot., vol. 3, 1903, p. 230, fig. 61 (in text).—[?] Bagg, Proc. U. S. Nat. Mus., vol. 34, 1908, p. 127.—Heron-Allen; and Earland, Journ. Quekett Micr. Club, ser. 2, vol. 10, 1909, pl. 34, fig. 7.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 156, fig. 63 (in text).—Pearcey, Trans. Roy. Soc. Edinburgh, vol. 49, 1914, p. 1003.

Crithionina abyssorum (part) Kiaer, Norske Nordhavs Expedition, No. 25, 1899, p. 7, pl. 1, figs. 1, 3 (not 2, 4).

Description.—Variety differing from the typical in its smaller size and hispid surface made up of a great number of sponge spicules arranged nearly perpendicular to the outer surface.

Diameter, usually not exceeding 1 mm.

Distribution.—Flint gives four Atlantic stations for this variety, *Albatross* D2570, 2571, 2379, 2394, in 420–1,813 fathoms, two of them south of Georges Bank, the other two in the northern part of the Gulf of Mexico. Besides this material I have but one station to add, D2203, south of Georges Bank, in 705 fathoms, bottom temperature 38.9° F. Flint also records it from the coast of Oregon in the Pacific, D3080 in 93 fathoms.

Pearcey's notes in his Antarctic paper are as follows:

> One specimen larger than the type attached to a rock fragment at station 420 (2,620 fathoms) [Antarctic]. Walls built of sponge spicules arranged perpendicularly in an amorphous siliceous cement and lined interiorly with a delicate chitinous membrane.

He also notes that the variety was taken by the *Triton* and *Knight Errant* Expeditions in the Faroe Channel and "recorded by me under the generic name of *Sorosphaera* sp., with several others of a similar character."

This is a rather definite variety and can hardly be mistaken for any other.

CRITHIONINA GRANUM Goës.

Plate 26, figs. 6, 7.

Crithionina granum Goës, Köngl. Svensk. Vet-Akad. Handl., vol. 25, No. 9, 1894, p. 15, pl. 3, figs. 28–33.—Schaudinn, Bergens Mus. Aaborg, 1894–95 (1896), No. 9, p. 4.—Rhumbler, Arch. Prot., vol. 3, 1903, p. 231, fig. 58 (in text).

Description.—Test free, sublenticular, subglobose or oblong, occasionally roughly polygonal, slightly roughened; wall composed of sand grains with a few sponge spicules irregularly incorporated, loosely cemented, somewhat friable, interior with irregularly filled space, intercommunicating; apertures numerous, many scattered small ones with a few larger ones more or less grouped together.

Diameter, up to 2 mm.; length, up to 4 mm.

Distribution.—Goës described this species from the Skagerack in 300 meters. Schaudinn had it from off Bergen, Norway. Our western Atlantic material does not seem to be identical with this species.

CRITHIONINA GRANUM Goës, var. SUBSIMPLEX Goës.

Crithionina granum Goës, var. *subsimplex* Goës, Bull. Mus. Comp. Zoöl., vol. 29, 1896, p. 25.—Rhumbler, Arch. Prot., vol. 3, 1903, p. 232.

According to Goës the form is described as follows:

> Resembles in shape the type, but the walls are thin and the subdividing lamina of the cavity very much reduced, sometimes nearly obsolete.

Distribution.—Goës described this variety from the following stations: Caribbean Sea, 1,345 fathoms rare; *Albatross* H58, 1,345 fathoms, about 35 miles west off Santa Cruz, 17° 45′ N., 65° 35′ W., in globigerina ooze.

Genus THURAMMINA H. B. Brady, 1879.

Thurammina H. B. Brady (type, *T. papillata* H. B. Brady), Quart. Journ. Micr. Sci., vol. 19, 1879, p. 45.—Bütschli, in Bronn, Klassen und Ordnungen des Thierreichs, vol. 1, 1880, p. 202.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 321.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 57.

Thyrammina Rhumbler, Arch. Prot., vol. 3, 1903, p. 236.

Lituola W. B. Carpenter (part), The Microscope, ed. 5, 1875, p. 533.

Description.—Test typically free, usually nearly spherical, but in some species compressed, chamber single and undivided in typical species; wall thin, composed of fine sand with more or less chitin; apertures several to many at the end of nipplelike protuberances of the surface, occasionally wanting.

Several species occur in the Atlantic, some of them, so far as known, of restricted distribution.

THURAMMINA PAPILLATA H. B. Brady.

Plate 28, figs. 10, 11.

"Orbuline Lituola" W. B. Carpenter, The Microscope, ed. 5, 1875, p. 533, figs. 273*g*, *h*.

Thurammina papillata H. B. Brady, Quart. Journ. Micr. Sci., vol. 19, 1879, p. 45, pl. 5, figs. 4-8.—W. B. Carpenter, The Microscope, ed. 6, 1881, p. 561, figs. 320*g*, *h*.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 321, pl. 36, figs. 7-18.—Egger, Abh. bay. Akad. Wiss. München, vol. 18, 1893, p. 263, pl. 5, fig. 9.—Chapman, Proc. Zool. Soc. London, 1895, p. 17.—Goës, Bull. Mus. Comp. Zoöl., vol. 29, 1896, p. 25.—Flint, Rep. U. S. Nat. Mus., 1897 (1899), p. 278, pl. 22, fig. 1.—Earland, Journ. Quekett Micr. Club, ser. 2, vol. 9, 1905, p. 201, pl. 11, figs. 6, 7; pl. 14, figs. 1, 3.—Chapman and Howchin, Mem. geol. Surv. N. S. Wales, vol. 14, 1905, p. 9, pl. 2, fig. 13.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 58, fig. 66 (in text).—Heron-Allen and Earland, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 47.—Pearcey, Trans. Roy. Soc. Edinburgh, vol. 49, 1914, p. 1003.—Heron-Allen and Earland, Trans. Zool. Soc., vol. 20, 1915, p. 617.

Thyrammina papillata Rhumbler, Arch. Prot., vol. 3, 1903, p. 238, figs. 68*a*-*c* (in text.)

Description.—Test typically free, occasionally adherent, generally spherical, or when attached the lower surface flattened or otherwise modified to conform to the surface to which it is attached; usually consisting of a single undivided chamber but occasionally with one or more other chambers included in the outer one; wall very thin, composed of sand grains very neatly cemented with an abundance of reddish or yellowish brown cement; apertures numerous, irregularly scattered over the surface, situated at the ends of nipplelike projections, usually short but in some cases of considerable length, becoming tubular; color usually yellowish or reddish brown.

Diameter, up to 1.5 mm.

Distribution.—From the published records this seems to be a common species. It is known from the following Atlantic regions: North Sea and about the British Isles, Faroe Channel, 45–1,476 fathoms; at three *Challenger* stations north of the equator, 390–2,470 fathoms; six *Challenger* stations in the south Atlantic, 350–2,350 fathoms. From the western Atlantic Flint records it from *Albatross* stations D2225, south of Long Island; D2383 and 2385, Gulf of Mexico; D2570, southeast of Georges Bank, and 2760, off the coast of Brazil. These range in depth from 730 to 2,512 fathoms. I have seen the material from these stations and from D2037 in 1,731 fathoms southwestward from Georges Bank, bottom temperature 38° F., and H82 from the Caribbean Sea.

Outside the Atlantic it is known from the North and South Pacific and from the Antarctic and fossil specimens from the Jurassic have been assigned to this species.

Thurammina papillata—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		° F.		
9888	U.S.N.M.	1	D2037....	38 53 00 N.; 69 23 30 W.	1,731	38	glob. oz.....	Rare.
10036	U.S.N.M.	1	D2038....	38 30 30 N.; 69 08 25 W.	2,033	....	glob. oz.....	Rare.
9517	U.S.N.M.	1	H82......	13 29 00 N.; 62 42 40 W.	1,051	....	for.m.bk.sp .	Rare.
6269	U.S.N.M.	1	Porcupine 31.	....	1,360	....	....	....

THURAMMINA ALBICANS H. B. Brady.

Plate 28, figs. 4–8.

Thurammina albicans H. B. Brady, Quart. Journ. Micr. Sci., vol. 19, 1879, p. 46; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 323, pl. 37, figs. 2–7.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 58, figs. 67–72 (in text).—Pearcey, Trans. Roy. Soc. Edinburgh, vol. 49, 1914, p. 1003.

Thyrammina albicans Rhumbler, Arch. Prot., vol. 3, 1903, p. 237, fig. 67 (in text).

Brady describes this species as follows:

> Test spherical, or nearly so; with few, usually about six, mammillate orifices, equidistant and regularly disposed. Walls somewhat thicker than those of the type [*T. papillata*]; texture very finely arenaceous; color nearly white.
>
> Diameter, about one-ninetieth inch (0.28 mm.).

Distribution.—The only Atlantic record for this species is the type station, *Challenger* 323, in 1,900 fathoms, off the South American coast in the latitude of Buenos Aires. It is known from a single station in the North Pacific in 2,050 fathoms (Brady, Cushman), and Pearcey records two specimens from the Antarctic in 1,946 fathoms.

This small species is either very rare, as would seem from the records, or has been overlooked on account of its small size. All three stations are in deep water. It has not been met with in the North Atlantic material.

THURAMMINA CARIOSA Flint.

Plate 28, fig. 1.

Thurammina cariosa Flint, Ann. Rep. U. S. Nat. Mus., 1897 (1899), p. 278, pl. 22, fig. 2.

Thyrammina cariosa Rhumbler, Arch. Prot., vol. 3, 1903, p. 238, fig. 69 (in text).

The original description of this form is as follows:

> Spherical; surface rough, as if eroded; walls rather thick, cavernous; cavity globular, smooth; apertures not tubular; color a dirty brown. Differs from *T. favosa* in the thicker walls and coarser structure, the eroded rather than reticulated surface, the cavernous walls and the nontubular orifices.
>
> Diameter, about 1 mm. (one-twenty-fifth inch).

Distribution.—Flint described this species from two *Albatross* stations in the northern part of the Gulf of Mexico, D2385 in 420 and D2394 in 730 fathoms. The material from both of these I have seen and additional material from D2571 in 1,356 fathoms southeast of Georges Bank. The material from this last station is smaller and whiter than from the Gulf of Mexico but the surface is very similar.

THURAMMINA FAVOSA Flint.

Plate 28, figs. 2, 3.

Thurammina favosa Flint, Ann. Rep. U. S. Nat. Mus., 1897 (1899), p. 278, pl. 21, fig. 2.—Millett, Journ. Roy. Micr. Soc., 1904, p. 608, pl. 11, fig. 7.

Thyrammina favosa Rhumbler, Arch. Prot., vol. 3, 1903, p. 236, fig. 65 (in text).

This form is described as follows:

> Test spherical; walls very thin, arenaceous, brown; surface ornamented with a network of thin prominent ridges extending uniformly over the whole test, forming hexagonal pits; cavity smooth; apertures numerous, small, at the end of short tubular processes from some of the points of junction of the ridges.
>
> Diameter, about 0.8 mm. (one-thirtieth inch).

Distribution.—Flint described this species from two *Albatross* stations in the northern part of the Gulf of Mexico, D2374 in 26 and D2394 in 420 fathoms. I have found very typical material also from D2751 in 687 fathoms in the Carribbean Sea just west of the Leeward Islands. It also occurred at D2505 off Nova Scotia. These are very typical.

Millett records the species from several stations in the Malay Archipelago, but his figured specimen is very much more coarsely reticulate than the types and contain but a few facets. He makes the following note of his material: "* * * There is a certain amount of flexibility about the test reminiscent of the vegetable kingdom to which possibly [it] may belong." It may be that this is after all not identical with the Gulf of Mexico and Carribbean species.

Pearcey refers an Antarctic form to this species as a variety.

Thurammina favosa—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
.....	U.S.N.M.	....	D2374....	29 11 30 N.; 85 29 00 W.	26	....	s. g. brk. sh.	Rare.
.....	U.S.N.M.	....	D2394....	28 38 30 N.; 87 02 00 W.	420	41.8	gn. m.......	Rare.
9516	U.S.N.M.	1	D2505....	44 23 30 N.; 61 44 15 W.	93	42.3	dk. br. m...	Rare.
.....	U.S.N.M.	....	D2751....	16 54 00 N.; 63 12 00 W.	687	40	bu. glob. oz..	Rare.

THURAMMINA COMPRESSA H. B. Brady.

Plate 28, fig. 9.

Thurammina compressa H. B. BRADY, Quart. Journ. Micr. Sci., vol. 19, 1879, p. 46, pl. 5, fig. 9; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 324, pl. 37, fig. 1.

Thyrammina compressa RHUMBLER, Arch. Prot., vol. 3, 1903, p. 238, fig. 70 (in text).

Brady describes this species as follows:

> Test rounded, compressed, sublenticular; with numerous perforated mammillate protuberances arranged irregularly on the periphery. Walls thin, chitinoarenaceous; color dark brown.
>
> Diameter, about one-fiftieth inch (0.5 mm.).

Distribution.—The type station, south of the Rockall Bank in 630 fathoms is the only record for this peculiar species. The following note as well as the figure and description is from Brady:

> This also is a scarce modification of the type. It is distinguished by its membranous, only slightly arenaceous test, and its compressed almost lenticular contour. It is possible that the latter character may be in a measure accidental, and due to the partial collapse of the more or less flexible walls, as not unfrequently occurs in other chitino-arenaceous forms. * * * At the same time, the position of the mammilate orifices, on the peripheral margin, and not on the lateral faces of the test, makes it more likely that the natural form is retained by the dried specimens.

Subfamily 3. HYPERAMMININAE.

Genus HYPERAMMINA H. B. Brady, 1878.

Rhabdopleura? DAWSON, Ann. Mag. Nat. Hist., ser. 4, vol. 7, 1871, p. 86.

Hyperammina H. B. BRADY (type, *H. elongata* H. B. Brady), (part), Ann. Mag. Nat. Hist., ser. 5, vol. 1, 1878, p. 433.—BÜTSCHLI, in Bronn, Klassen und Ordnungen Thierreichs, vol. 1, 1880, p. 193.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 257.—RHUMBLER, Nachr. königl. Ges. Wiss. Göttingen, 1895, p. 82; Arch. Prot., vol. 3, 1903, p. 257.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 60.—RHUMBLER, Plankton Exped., Foraminiferen, pt. 2, 1913, pp. 351, 381.

Hyperammina + *Bactrammina* EIMER and FICKERT, Zeitschr. Wiss. Zool., vol. 65, 1899, pp. 673, 675.

Description.—Test free, elongate, in general a simple cylindrical tube, straight or slightly curved with a swollen proloculum at the proximal end, distal end open and serving as the aperture; wall composed of sand grains, interior usually smoothly finished, exterior often rough, in some species the exterior smoothly finished and the cement in greater excess.

The genus as a rule seems to be very widely distributed but most abundantly represented in cool waters, temperature evidently having more control than depth, especially in the case of *H. subnodosa.*

HYPERAMMINA ELONGATA H. B. Brady.

Plate 29, fig. 4.

Hyperammina elongata H. B. BRADY (part) Ann. Mag. Nat. Hist., ser. 5, vol. 1, 1878, p. 433, pl. 20, figs. 2*a*, *b;* Quart. Journ. Micr. Sci., vol. 19, 1879, p. 72; Denkschr. Akad. Wiss. Wien, vol. 42, 1881, p. 98.—BALKWILL and WRIGHT, Proc. Roy. Irish Acad., vol. 3, 1882, p. 546.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 257, pl. 23, figs. 4, 7 (not 9, 10).—GÖES, Köngl. Svensk. Vet. Akad. Handl., vol. 25, No. 9, 1894, p. 17, pl. 4, figs. 56–58 (not 55).—CHAPMAN, Proc. Zool. Soc. London, 1895, p. 13.—GÖES, Bull. Mus. Comp. Zoöl., vol. 29, 1896, p. 22.—FLINT, Rep. U. S. Nat. Mus., 1897 (1899), p. 270, pl. 10, fig. 2 (part).—KIAER, Norske Nordhavs Expedition, No. 25, 1899, p. 4.—RHUMBLER, Arch. Prot., vol. 3, 1903, p. 258, figs. 98*a*, *b* (in text).—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 60, figs. 73, 74 (in text).—AWERINZEW, Mem. Acad. Imp. Sci. St. Petersburg, ser. 8, vol. 29, No. 3, 1911, p. 11.—PEARCEY, Trans. Roy. Soc. Edinburgh, vol. 49, 1914, p. 1004.—HERON-ALLEN and EARLAND, Trans. Linn. Soc. London, vol. 11, pt. 13, 1916, p. 220.

Bactrammina elongata EIMER and FICKERT, Zeitschr. Wiss. Zool., vol. 65, 1899, p. 673.

Description.—Test elongate cylindrical, consisting of a subglobular proloculum and long, slender tubular second chamber, of lesser diameter than the proloculum; wall composed of sand grains firmly cemented, usually consisting of a single layer, exterior rough but the interior usually smoothly finished, cement yellowish brown; aperture at the distal end of the tube, circular without a lip or other modification; color dependent upon the constituent sand particles.

Diameter, about 0.5 mm; length, up to 8 mm.

Distribution.—This seems to be a very common and well-distributed species occurring throughout the Atlantic both in typical Globigerina-ooze and other types of bottom. It is recorded from the Arctic to the Antartic and is common off the coasts of Europe and on our own shores, the Atlantic coast, Gulf of Mexico, and Caribbean Sea, as well as off the South American coast.

Specimens with the proloculum intact are not so common as those which are broken and show only the tubular chamber, but in well-preserved material a number of complete specimens are usually found.

Hyperammina elongata—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
9662	U.S.N.M.	2	D2035....	39 26 16 N.; 70 02 37 W.	1,362	....	glob. oz.....	Few.
9663	U.S.N.M.	7	D2036....	38 52 40 N.; 69 24 40 W.	1,735	38	glob. oz.....	Common.
9664	U.S.N.M.	3	D2038....	38 30 30 N.; 69 08 35 W.	2,033	....	glob. oz.....	Few.
9665	U.S.N.M.	5	D2041....	39 22 50 N.; 68 25 00 W.	1,608	38	glob. oz.....	Few.
9666	U.S.N.M.	2	D2042....	39 33 00 N.; 68 26 45 W.	1,555	38.5	glob. oz.....	Few.
9667	U.S.N.M.	3	D2043....	39 49 00 N.; 68 28 30 W.	1,467	38.5	glob. oz.....	Few.
9668	U.S.N.M.	1	D2072....	41 53 00 N.; 65 35 00 W.	858	39	gy. m.......	Rare.
9669	U.S.N.M.	1	D2093....	39 42 50 N.; 71 01 20 W.	1,000	39	s. m.........	Rare.
9673	U.S.N.M.	2	D2105....	37 50 00 N.; 73 03 50 W.	1,395	41	glob. oz.....	Rare.
9674	U.S.N.M.	1	D2106....	37 41 20 N.; 73 03 20 W.	1,497	42.5	glob. oz.....	Rare.
9672	U.S.N.M.	2	D2174....	38 15 00 N.; 72 03 00 W.	1,594	....	gy. m.......	Rare.
9671	U.S.N.M.	1	D2213....	39 58 30 N.; 70 30 00 W.	384	39.5	gn. m.......	Rare.
9670	U.S.N.M.	1	D2217....	39 47 20 N.; 69 34 15 W.	924	38.1	gy. m.......	Rare.
9316	U.S.N.M.	10	D2221....	39 05 30 N.; 70 44 30 W.	1,525	36.9	gy. oz.......	Common.
9317	U.S.N.M.	1	D2222....	39 03 15 N.; 70 50 45 W.	1,537	36.9	gy. oz.......	Rare.
9318	U.S.N.M.	4	D2226....	37 00 00 N.; 71 54 00 W.	2,045	36.8	glob. oz.....	Few.
9675	U.S.N.M.	1	D2262....	39 54 45 N.; 69 29 45 W.	250	41.6	gn. m. s.....	Rare.
9676	U.S.N.M.	6	D2372....	29 15 30 N.; 85 29 30 W.	27	....	g............	Few.
9319	U.S.N.M.	2	D2399....	28 44 00 N.; 86 18 00 W.	196	51.6	gy. m.......	Few.
9320	U.S.N.M.	1	D2531....	40 42 00 N.; 66 33 00 W.	852	34.4	gy. m.......	Rare.
9321	U.S.N.M.	1	D2550....	39 44 30 N.; 70 30 45 W.	1,081	38.5	br. m.......	Rare.
9322	U.S.N.M.	1	D2564....	39 22 00 N.; 71 23 30 W.	1,390	37.3	gy. oz.......	Rare.
9323	U.S.N.M.	2	D2570....	39 54 00 N.; 67 05 30 W.	1,813	36.8	glob. oz.....	Rare.
9677	U.S.N.M.	3	D2677....	32 39 00 N.; 76 50 30 W.	478	39.3	gn. m.......	Rare.
9678	U.S.N.M.	2	D2679....	32 40 00 N.; 76 40 30 W.	782	38.6	lt. gy. oz.....	Rare.
9324	U.S.N.M.	1	D2706....	41 28 30 N.; 65 35 30 W.	1,188	....	gy. oz. for...	Rare.
9325	U.S.N.M.	1	D2713....	38 20 00 N.; 70 08 30 W.	1,859	....	br. oz.......	Rare.
9679	U.S.N.M.	1	D2760....	12 07 00 S.; 37 17 00 W.	1,019	39.5	br. co.......	Rare.
9680	U.S.N.M.	1	D2761....	15 39 00 S.; 38 32 54 W.	818	39	pter. oz.....	Rare.
9326	U.S.N.M.	1	H79......	14 20 30 N.; 63 10 00 W.	821	....	co. s. sh. for.	Rare.

HYPERAMMINA FRIABILIS H. B. Brady.

Plate 29, figs. 1–3.

Hyperammina elongata H. B. Brady (part), Ann. Mag. Nat. Hist., ser. 5, vol. 1, 1878, p. 433; Quart. Journ. Micr. Sci., vol. 19, 1879, p. 32.

Hyperammina friabilis H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 258, pl. 23, figs. 1–3, 5, 6.—Göes, Köngl. Svensk. Vet. Akad. Handl., vol. 25, No. 9, 1894, p. 17, pl. 4, fig. 59; Bull. Mus. Comp. Zoöl., vol. 29, 1896, p. 22.—Flint, Rep. U. S. Nat. Mus., 1897 (1899), p. 269, pl. 10, fig. 1.—Rhumbler, Arch. Prot., vol. 3, 1903, p. 258, figs. 99*a*, *b* (in text).—Cushman, Bull. 71, U.S. Nat. Mus., pt. 1, 1910, p. 62, fig. 76 (in text).—Pearcey, Trans. Roy. Soc. Edinburgh, vol. 49, 1914, p. 1004.—Heron-Allen and Earland, Trans. Linn. Soc. London, vol. 11, pt. 13, 1916, p. 220.

Description.—Test elongate, subcylindrical, often somewhat tapering toward the apertural end, straight or nearly so, composed of a rather large globular proloculum and elongate cylindrical or slightly tapering second chamber slightly less in diameter than the proloculum; wall thick, loosely cemented especially on the exterior, rough, composed usually of fine sand, sometimes mixed with coarse sand particles, interior commonly smoother, with a yellowish-brown cement; aperture circular at the distal end of the second chamber.

Diameter, 2 mm.; length, up to 15 mm.

Distribution.—From the available records this is a widely distributed species, being recorded from about the British Isles and

Scandinavia, off the coast of South America and the Antarctic, the East Indies and North Pacific. In the *Albatross* material it is especially abundant in material from the region of Georges Bank southward to Cape Hatteras, although recorded from the Gulf of Mexico and the Caribbean Sea. The material I have had from these two latter regions, however, is not as typical as the east coast specimens. On our east coast depths range from 390 to 1,813 fathoms and bottom temperatures from 36.8° to 40.1° with one at 45.0° F.

There seems to be a tendency here to show both megalospheric and microspheric forms. The usual form is the megalospheric, where the proloculum is greater in diameter than the tubular second chamber, while in the rarer microspheric form the proloculum is hardly distinguishable from the tubular chamber in diameter and the whole test is somewhat larger.

Hyperammina friabilis—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°*F.*		
9692	U.S.N.M.	1	D2018....	37 12 22 N.; 74 20 04 W.	788	39	bu. m.......	Rare.
9683	U.S.N.M.	10+	D2043....	39 49 00 N.; 68 28 30 W.	1,467	38.5	glob. oz.....	Common.
9684	U.S.N.M.	2	D2052....	39 40 05 N.; 69 21 25 W.	1,098	45	glob. oz.....	Few.
9685	U.S.N.M.	2	D2111....	35 09 50 N.; 74 57 40 W.	938	....	gn. m.......	Few.
9686	U.S.N.M.	1	D2115....	35 49 30 N.; 74 34 45 W.	843	39	m. fne. s....	Rare.
9687	U.S.N.M.	4	D2150....	13 34 45 N.; 81 21 10 W.	380	45.75	wh. crs. s....	Few.
9688	U.S.N.M.	1	D2171....	37 59 30 N.; 73 48 40 W.	444	39.5	gn. m.......	Rare.
9689	U.S.N.M.	1	D2172....	38 01 15 N.; 73 44 00 W.	568	39	gn. m.......	Rare.
9690	U.S.N.M.	4	D2202....	39 38 00 N.; 71 39 45 W.	515	39.1	gn. m.......	Few.
9691	U.S.N.M.	4	D2203....	39 34 15 N.; 71 41 15 W.	705	38.9	gn. m. s.....	Few.
9337	U.S.N.M.	2	D2229....	37 38 40 N.; 73 16 30 W.	1,423	37.7	glob. oz.....	Rare.
9338	U.S.N.M.	1	D2234....	39 09 00 N.; 72 03 15 W.	810	38.6	gn. m.......	Rare.
9693	U.S.N.M.	5	D2377....	27 07 30 N.; 88 08 00 W.	210	67	gy. m.......	Few.
9694	U.S.N.M.	1	D2385....	28 51 00 N.; 88 18 00 W.	730	40.1	gy. m.......	Rare.
9339	U.S.N.M.	1	D2399....	28 44 00 N.; 86 18 00 W.	196	51.6	gy. m.......	Rare.
9340	U.S.N.M.	3	D2547....	39 54 30 N.; 70 20 00 W.	390	39.6	gn. m.......	Few.
9341	U.S.N.M.	1	D2552....	39 47 07 N.; 70 35 00 W.	721	39.6	gy. oz.......	Rare.
9342	U.S.N.M.	2	D2562....	39 15 30 N.; 71 25 00 W.	1,434	37.3	gy. oz.......	Rare.
9343	U.S.N.M.	10+	D2564....	39 22 00 N.; 71 23 30 W.	1,390	37.3	gy. oz.......	Common.
9344	U.S.N.M.	10	D2570....	39 54 00 N.; 67 05 30 W.	1,813	36.8	glob. oz.....	Common.
6254	U.S.N.M.	3	Porcupine 47	....	540	....	....	

HYPERAMMINA SUBNODOSA H. B. Brady.

Plate 29, figs. 7, 8.

Rhabdopleura, species, G. W. Dawson, Ann. Mag. Nat. Hist., ser. 4, vol. 7, 1871, p. 86, fig. 7.

Hyperammina subnodosa H. B. Brady, Rep. Voy. *Challenger* Zoology, vol. 9, 1884, p. 259, pl. 23, figs. 11–14.—Egger, Abh. bay. Akad. Wiss. München, vol. 18, 1893, p. 255, pl. 4, fig. 32.—Goës, Köngl. Svensk. Vet. Akad. Handl., vol. 25, No. 9, 1894, p. 16, pl. 3, figs. 42–53 (not 54).—Schlumberger, Mem. Soc. Zool. France, vol. 7, 1894, p. 254.—Rhumbler, Arch. Prot., vol. 3, 1903, p. 259, figs. 100*a*, *b* (in text).—Cushman, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 63, figs. 80*a*, *b* (in text).—Awerinzew, Mem. Acad. Imp. Sci. St. Petersburg, ser. 8, vol. 29, No. 3, 1911, p. 12.—Pearcey, Trans. Roy. Soc. Edinburgh, vol. 49, 1914, p. 1004.

Description.—Test elongate, subcylinderical, larger than others of the genus, proloculum large, thick walled, tubular chamber of lesser diameter usually, irregularly constricted at intervals, walls very thick, coarsely arenaceous, somewhat roughened; interior smoother; aperture circular, at the distal end of the tube; color light grayish. Length, up to 20 mm.

Distribution.—This is very evidently a cold-water species, being found under cold, deep water conditions and also in shallow water where temperatures are very low. In the North Pacific paper I noted that at the one shallow-water station at which the temperature even in September was but 30.4° F. In the Atlantic *Albatross* material the species has occurred at but few stations, five scattering stations from George Bank to the Virginia Capes in small numbers, depths 428 to 1,813 fathoms, bottom temperatures 36.° to 40° F. Farther north, however, at two stations, D2453, 82 fathoms, and D2458, 89 fathoms, in rather shallow water the temperatures were 29.7° and 29.5° F., respectively. At these stations in latitude 51° and 52° N. in the influence of the Greenland current and floating ice the species is extremely abundant, making up a large part of the bottom sample and could almost be called a "*Hyperammina subnodosa* bottom." Awerinzew records it from the Arctic north of Siberia and mentions that it is very characteristic of the Polar Sea. Pearcey records it from the Antarctic. It is recorded from off Greenland by Brady, who says that some of the finest specimens were from this region. He records it off Brazil and at other places, mostly in deep water.

Hyperammina subnodosa—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°*F.*		
9703	U.S.N.M.	1	D2212.....	39 59 30 N.; 70 30 45 W.	428	40	gn. m.......	Rare.
9345	U.S.N.M.	10+	D2453.....	47 10 00 N.; 51 10 00 W.	82	29.7	gn. m. fne. s.	Abundant.
9346	U.S.N.M.	10+	D2458.....	46 48 30 N.; 52 34 00 W.	89	29.5	s. gn. m.....	Abundant.
9347	U.S.N.M.	2	D2696.....	46 53 30 N.; 45 05 30 W.	98	....	gy. s. bk. sp.	Few.
9348	U.S.N.M.	10	D2697.....	47 40 00 N.; 47 35 30 W.	206	....	gn. m. bk. sp	Common.
9349	U.S.N.M.	5	D2729.....	36 36 00 N.; 74 32 00 W.	679	....	dk. gy. m...	Rare.
9350	U.S.N.M.	3	D2731.....	36 45 00 N.; 74 28 00 W.	781	....	gy. oz.......	Rare.
6255	U.S.N.M.	7	*Valorous* A	....	20	....	....	

HYPERAMMINA LAEVIGATA J. Wright.

Plate 29, figs. 5, 6.

Hyperammina elongata H. B. Brady (part), Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 257, pl. 23, figs. 9, 10 (not 3, 7, 8).—Göes, Köngl. Svensk. Vet. Akad. Handl., vol. 25, No. 9, 1894, p. 17, pl. 4, fig. 55 (not 56–58).—Flint, Rep. U. S. Nat. Mus., 1897 (1899), p. 270, pl. 10, fig. 2 (in part).—Rhumbler. Arch. Prot., vol. 3, 1903, p. 258 (part).

Hyperammina elongata H. B. Brady, var. *laevigata* J. Wright, Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 466, pl. 20, fig. 1.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 61, fig. 75 (in text).

Description.—Test free, elongate, in general a simple cylindrical tube, straight or slightly curved with a swollen proloculum at the proximal end, distal end open and serving as the aperture; wall composed of sand grains, interior usually smoothly finished, exterior often rough, in some species the exterior smoothly finished and the cement in greater excess.

The genus as a rule seems to be very widely distributed but most abundantly represented in cool waters, temperature evidently having more control than depth, especially in the case of *H. subnodosa.*

HYPERAMMINA ELONGATA H. B. Brady.

Plate 29, fig. 4.

Hyperammina elongata H. B. BRADY (part) Ann. Mag. Nat. Hist., ser. 5, vol. 1, 1878, p. 433, pl. 20, figs. 2*a*, *b;* Quart. Journ. Micr. Sci., vol. 19, 1879, p. 72; Denkschr. Akad. Wiss. Wien, vol. 42, 1881, p. 98.—BALKWILL and WRIGHT, Proc. Roy. Irish Acad., vol. 3, 1882, p. 546.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 257, pl. 23, figs. 4, 7 (not 9, 10).—GÖES, Köngl. Svensk. Vet. Akad. Handl., vol. 25, No. 9, 1894, p. 17, pl. 4, figs. 56–58 (not 55).—CHAPMAN, Proc. Zool. Soc. London, 1895, p. 13.—GÖES, Bull. Mus. Comp. Zoöl., vol. 29, 1896, p. 22.—FLINT, Rep. U. S. Nat. Mus., 1897 (1899), p. 270, pl. 10, fig. 2 (part).—KIAER, Norske Nordhavs Expedition, No. 25, 1899, p. 4.—RHUMBLER, Arch. Prot., vol. 3, 1903, p. 258, figs. 98*a*, *b* (in text).—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 60, figs. 73, 74 (in text).—AWERINZEW, Mem. Acad. Imp. Sci. St. Petersburg, ser. 8, vol. 29, No. 3, 1911, p. 11.—PEARCEY, Trans. Roy. Soc. Edinburgh, vol. 49, 1914, p. 1004.—HERON-ALLEN and EARLAND, Trans. Linn. Soc. London, vol. 11, pt. 13, 1916, p. 220.

Bactrammina elongata EIMER and FICKERT, Zeitschr. Wiss. Zool., vol. 65, 1899, p. 673.

Description.—Test elongate cylindrical, consisting of a subglobular proloculum and long, slender tubular second chamber, of lesser diameter than the proloculum; wall composed of sand grains firmly cemented, usually consisting of a single layer, exterior rough but the interior usually smoothly finished, cement yellowish brown; aperture at the distal end of the tube, circular without a lip or other modification; color dependent upon the constituent sand particles.

Diameter, about 0.5 mm; length, up to 8 mm.

Distribution.—This seems to be a very common and well-distributed species occurring throughout the Atlantic both in typical Globigerina-ooze and other types of bottom. It is recorded from the Arctic to the Antartic and is common off the coasts of Europe and on our own shores, the Atlantic coast, Gulf of Mexico, and Caribbean Sea, as well as off the South American coast.

Specimens with the proloculum intact are not so common as those which are broken and show only the tubular chamber, but in well-preserved material a number of complete specimens are usually found.

Length, up to 4 mm.; breadth of the proloculum, about 0.5 mm.; of the tubular chamber, about 0.25 to 0.35 mm.

Distribution.—Type-specimens from *Albatross* station D2212, in 428 fathoms, south of Georges Bank (latitude 39° 59′ 30″ N.; longitude 70° 30′ 45″ W.), bottom temperature 40° F. (Cat. No. 9927, U.S.N.M.). The only other stations for this species are D2171, somewhat farther to the southwest, in 444 fathoms (latitude 37° 59′ 30″ N.; longitude 73° 48′ 40″ W.), bottom temperature 39.5 F.; D2262, in 250 fathoms, off Nantucket, and D2377, in the Gulf of Mexico.

The only species of this genus that at all resembles it closely is *H. laevigata*, from which our species differs in the shape of the proloculum and in the closely constricted and tortuous second chamber.

Hyperammina distorta—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
9926	U.S.N.M.	3	D2171....	37 59 30 N.; 73 48 40 W.	444	39.5	gn. m.......	Few.
9927	U.S.N.M.	4	D2212....	39 59 30 N.; 70 30 45 W.	428	40	gn. m.......	Few.
9928	U.S.N.M.	3	D2262....	39 54 45 N.; 69 29 45 W.	250	41.6	gn. m. s.....	Few.
9929	U.S.N.M.	1	D2377....	27 07 30 N.; 88 08 00 W.	210	67	gy. m.......	Rare.

Genus PSAMMATODENDRON Norman, 1881.

Psammatodendron NORMAN, MSS. in Brady, Denkschr. k. Akad. Wiss. Wien, vol. 43, 1881, p. 98 (type, *P. arborescens* Norman); Ann, Mag. Nat. Hist., ser. 5, vol. 8, 1881, p. 404.—EIMER and FICKERT, Zietschr. Wiss. Zool., vol. 65, 1899, pp. 670, 673.

Hyperammina (part) H. B. BRADY, Rep. Voy. *Challenger*, Zool., vol. 9. 1884, p. 262.—GOËS, Köngl. Svensk. Vet. Akad. Handl., vol. 25, No. 9, 1894, p. 18.—RHUMBLER, Arch. Prot., vol. 3, 1903, p. 260.

Description,—Test attached by the bulbous proloculum, remainder of test free and erect, dichotomously branching, tubular, of even diameter throughout, wall arenaceous with ferruginous cement, open ends of the tubes serving as apertures.

PSAMMATODENDRON ARBORESCENS Norman.

Plate 30, figs. 1, 2.

Psammatodendron arborescens NORMAN, MSS. in H. B. Brady, Denkschr. k Akad. Wiss. Wien, vol. 43, 1881, p. 98; Ann. Mag. Nat. Hist., ser. 5, vol. 8, 1881, p. 404.—EIMER and FICKERT, Zeitschr. Wiss. Zool., vol. 65, 1899, p. 670.

Hyperammina arborescens H. B. BRADY, Rep Voy. *Challenger*, Zoology, vol. 9, 1884, p. 262, pl. 28, figs. 12, 13.—WRIGHT, Proc. Belfast Nat. Field Club, 1884–85, App. IX, 1886, p. 319, pl. 26, fig. 1.—GOËS, Köngl. Svensk. Vet. Akad. Handl., vol. 25, No. 9, 1884, p. 18, pl. 4, figs. 63, 64.—CHAPMAN, Proc. Zool. Soc. London, 1895, p. 13.—SCHAUDINN, Bergens Mus. Aaborg, 1894–95, No. 9, p. 5.—RHUMBLER, Arch. Prot., vol. 3, 1903, p. 260, fig. 102 (in text).—AWERINZEW, Mem. Acad. Imp. Sci. St. Petersburg, ser. 8, vol. 29, No. 3, 1911, p. 11.—HERON-ALLEN and EARLAND, Trans. Linn. Soc. London, vol. 11, pt. 13, 1916, p. 220.

Description.—Test attached by the proloculum which is bulbous, remainder of test tubular, of nearly uniform diameter, irregularly dichotomously branching, wall composed of fine sand grains with an abundance of reddish-brown cement; apertures at the ends of the tubes.

Length, up to 5 mm.

Distribution.—On the eastern side of the Atlantic there are numerous records for this species. In the Arctic it is recorded from off Greenland, Iceland, Nova Zembla, Franz Joseph Land, and north of Siberia; off the coasts of Norway and Great Britain, and in the South Atlantic off Pernambuco, Brazil.

On the western side of the Atlantic this species seems to be either missing or overlooked. In the *Albatross* dredgings broken specimens have occurred which might have been assigned to this species but never sufficiently well preserved to make identification sure.

In Europe it usually occurs in comparatively shallow water, 200 fathoms being the shallowest. Off Brazil it was recorded at 350 fathoms.

Genus KALAMOPSIS de Folin, 1882.

Kalamopsis De Folin (type, *K. vaillanti* de Folin) Congrès Scient. Dax., 1882, p. 320; Act. Soc. Linn. Bordeaux, vol. 40 (ser. 4, vol. 10), 1886, p. 287.—Rhumbler, Arch. Prot., vol. 3, 1903, p. 272.

Description.—Test with a subglobular proloculum, with a subcylindrical second tubular chamber more or less definitely constricted at intervals but the interior not completely septate; wall composed of sand grains and fragments of spicules with a large amount of calcareous (?) cement; open end of the tubular chamber serving as the aperture.

This genus was erected by de Folin for the following species:

KALAMOPSIS VAILLANTI de Folin.

Kalamopsis vaillanti De Folin, Congrès Scient. Dax., 1882, p. 320; Act. Soc. Linn. Bordeaux, vol. 40 (ser. 4, vol. 10), 1886, p. 288, pl. 8, figs. 12*a*–*c*.—Rhumbler, Arch. Prot., vol. 3, 1903, p. 272, fig. 121 (in text).

Description.—Test with a bulbous, subglobular proloculum, followed by a second chamber, subcylindrical, tubular, more or less regularly constricted on the exterior, the portions thus formed subconical, the widest portion at the basal end; wall composed of sand grains, fragments of spicules, and large proportion of calcareous (?) cement; outside smooth except for occasional sand grains, interior smooth except at the constricted areas, where there are slight inwardly projecting portions of the wall slightly obstructing the tubular chamber at irregular intervals; aperture formed by the open end of the tube; color greenish gray.

Distribution.—This species was described by de Folin from the Gulf of Gascony and has not been recorded elsewhere.

According to the author's description and notes it seems allied to *Bathysiphon* in the general characters of the test.

Genus SACCORHIZA Eimer and Fickert, 1899.

Hyperammina H. B. Brady (part), Quart. Journ. Micr. Soc., vol. 19, 1879, p. 33; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 257.—Rhumbler, Nachr. Köngl. Ges. Wiss, Göttingen, 1895, p. 82; Arch. Prot., vol. 3, 1903, p. 257.

Saccorhiza Eimer, and Fickert (type, *Hyperammina ramosa* H. B. Brady), Zeitschr. Wiss. Zool., vol. 65, 1899, p. 670.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 64.—Pearcey, Trans. Roy. Soc. Edinburgh, vol. 49, 1914, p. 1004.

Description.—Test free, consisting of an ovoid proloculum with a branching tubular second chamber, wall composed of sand grains usually with the exterior roughened by projecting sponge spicules incorporated in the wall; apertures formed by the open ends of the tubular chamber.

The genus erected by Eimer and Fickert for this species differs from *Hyperammina* in its branching irregular habit and the typical inclusion of sponge spicules in the outer portion of the wall. It has a very wide distribution.

SACCORHIZA RAMOSA (H. B. Brady).

Plate 30, figs. 3, 4.

Hyperammina ramosa H. B. Brady, Quart. Journ. Micr. Sci., vol. 19, 1879, p. 33, pl. 3, figs. 14, 15; Denkschr. Akad. Wiss. Wien, vol. 42, 1881, p. 98; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 261, pl. 23, figs. 15–19.—H. B. Brady, Parker, and Jones, Trans. Zool. Soc. London, vol. 12, No. 7, 1888, p. 217, pl. 41, figs. 1–4, 13.—Egger, Abh. bay. Akad. Wiss. München, vol. 18, 1893, p. 255, pl. 4, fig. 15.—Goës, Köngl. Svensk. Vet. Akad. Handl., vol. 25, No. 9, 1894, p. 18, pl. 4, figs. 61, 62.—Chapman, Proc. Zool. Soc., London, 1895, p. 13.—Goës, Bull. Mus. Comp. Zoöl., vol. 29, 1896, p. 22.—Flint, Rep. U. S. Nat. Mus., 1897 (1899), p. 270, pl. 11, fig. 1.—Rhumbler, Arch. Prot., vol. 3, 1903, p. 260, figs. 101*a*, *b* (in text).—Chapman, Biol. Results Fishing Experiments *Endeavour* 1909–14, vol. 3, pt. 1, 1915, p. 13.—Heron-Allen and Earland, Trans. Linn. Soc. London, vol. 11, pt. 13, 1916, p. 220.

Saccorhiza ramosa Eimer and Fickert, Zeitschr. Wiss. Zool., vol. 65, 1899, p. 670.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 65, fig. 81 (in text).—Pearcey, Trans. Roy. Soc. Edinburgh, vol. 49, 1914, p. 1004.

Description.—Test free, consisting of an ovoid proloculum passing into a short tubular chamber, soon becoming branched, of nearly uniform diameter throughout; wall composed of sand grains, firmly cemented with numerous sponge spicules fixed in the outer layer, giving a bristling appearance to the whole test; apertures formed by the open ends of the tubular chamber; color reddish or yellowish brown or gray.

Distribution.—This is another of the very widely distributed species of colder waters although it is not by any means limited to cold-water areas as are certain other species. It is known from all the great ocean basins and from the Antarctic to Franz Joseph Land. Its distribution is so wide that it is not necessary to quote separate regions. On the western side of the Atlantic it is already recorded by Goës and by Flint from the region of Cape Hatteras southward and at numerous stations in the Gulf of Mexico, and by Brady, Parker, and Jones from the Abrohlos Bank off Brazil.

In the *Albatross* material I have examined, it has occurred at nearly 50 stations, most of these being in the region between Georges Banks and Cape Hatteras, with some stations in the Gulf of Mexico, Caribbean Sea, and off the coast of Brazil. Depths at these stations range from 196 to 2,045 fathoms.

The selective habit of including sponge spicules in the outer layers of the wall seems to be very characteristic regardless of the bottom conditions.

Saccorhiza ramosa—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
9886	U.S.N.M.	1	D2018....	37 12 22 N.; 74 20 04 W.	788	39	bu. m.......	Rare.
9861	U.S.N.M.	3	D2035....	39 26 16 N.; 70 02 37 W.	1,362	....	glob. oz.....	Few.
9862	U.S.N.M.	5	D2036....	38 52 40 N.; 69 24 40 W.	1,735	38	glob. oz.....	Few.
9863	U.S.N.M.	2	D2038....	38 30 30 N.; 69 08 35 W.	2,033	....	glob. oz.....	Few.
9864	U.S.N.M.	7	D2041....	39 22 50 N.; 68 25 00 W.	1,608	38	glob. oz.....	Few.
9865	U.S.N.M.	4	D2042....	39 33 00 N.; 68 26 45 W.	1,555	38.5	glob. oz.....	Few.
9866	U.S.N.M.	8	D2043....	39 49 00 N.; 68 28 30 W.	1,467	38.5	glob. oz.....	Common.
9867	U.S.N.M.	1	D2048....	40 02 00 N.; 68 50 30 W.	547	39	crs. m. g....	Rare.
9868	U.S.N.M.	1	D2052....	39 40 05 N.; 69 21 25 W.	1,098	45	glob. oz.....	Rare.
9869	U.S.N.M.	2	D2072....	41 53 00 N.; 65 35 00 W.	858	39	gy. m.......	Rare.
9870	U.S.N.M.	3	D2097....	37 56 20 N.; 70 57 30 W.	1,917	....	glob. oz.....	Few.
9871	U.S.N.M.	2	D2105....	37 50 00 N.; 73 03 50 W.	1,395	41	glob. oz.....	Few.
9872	U.S.N.M.	1	D2106....	37 41 20 N.; 73 03 20 W.	1,497	42.5	glob. oz.....	Rare.
9873	U.S.N.M.	3	D2115....	35 49 30 N.; 74 34 45 W.	843	39	m. fne. s.....	Few.
9874	U.S.N.M.	2	D2150....	13 34 45 N.; 81 21 10 W.	382	45.75	wh. crs. s...	Few.
9875	U.S.N.M.	3	D2174....	38 15 00 N.; 72 03 00 W.	1,594	....	gy. m.......	Few.
9876	U.S.N.M.	1	D2189....	39 49 30 N.; 70 26 00 W.	600	39.7	gn. m. s......	Rare.
9877	U.S.N.M.	10+	D2202....	39 38 00 N.; 71 39 45 W.	515	39.1	gn. m.......	Common.
9879	U.S.N.M.	4	D2204....	39 30 30 N.; 71 44 30 W.	728	39.1	br. m.......	Few.
9491	U.S.N.M.	2	D2221....	39 05 30 N.; 70 44 30 W.	1,525	36.9	gy. oz.......	Few.
9492	U.S.N.M.	2	D2222....	39 03 15 N.; 70 50 45 W.	1,537	36.9	gy. oz.......	Few.
9493	U.S.N.M.	4	D2226....	37 00 00 N.; 71 54 00 W.	2,045	36.8	glob. oz.....	Few.
9494	U.S.N.M.	1	D2231....	38 29 00 N.; 73 09 00 W.	965	36.8	gy. oz.......	Rare.
9495	U.S.N.M.	2	D2234....	39 09 00 N.; 72 03 15 W.	810	38.6	gn. m.......	Rare.
9880	U.S.N.M.	2	D2377....	27 07 30 N.; 88 08 00 W.	210	67	gy. m.......	Rare.
9881	U.S.N.M.	1	D2381....	28 05 00 N.; 87 56 15 W.	1,330	....	lt. br. m.....	Rare.
9882	U.S.N.M.	10+	D2383....	28 32 00 N.; 88 06 00 W.	1,181	39.8	br. gn. m....	Common.
9883	U.S.N.M.	9	D2385....	28 51 00 N.; 88 18 00 W.	730	40.1	gy. m.......	Common.
9496	U.S.N.M.	1	D2399....	28 44 00 N.; 86 18 00 W.	196	51.6	gy. m.......	Rare.
9498	U.S.N.M.	1	D2547....	39 54 30 N.; 70 20 00 W.	390	39.6	gn. m.......	Rare.
9499	U.S.N.M.	2	D2550....	39 44 30 N.; 70 30 45 W.	1,081	38.5	br. m.......	Rare.
9500	U.S.N.M.	1	D2552....	39 47 07 N.; 70 35 00 W.	721	39.6	gy. oz.......	Rare.
9501	U.S.N.M.	1	D2564....	39 22 00 N.; 71 23 30 W.	1,390	37.3	gy. oz.......	Rare.
9502	U.S.N.M.	3	D2570....	39 54 00 N.; 67 05 30 W.	1,813	36.8	glob. oz.....	Few.
9503	U.S.N.M.	2	D2581....	39 43 00 N.; 71 34 00 W.	394	....	gn. m.......	Few.
9884	U.S.N.M.	2	D2677....	32 39 00 N.; 76 50 30 W.	478	39.3	gn. m.......	Few.
9504	U.S.N.M.	1	D2689....	39 42 00 N.; 71 15 30 W.	525	....	gn. m.......	Rare.
9505	U.S.N.M.	1	D2713....	38 20 00 N.; 70 08 30 W.	1,859	....	br. oz.......	Rare.
9506	U.S.N.M.	5	D2716....	38 29 30 N.; 70 57 00 W.	1,631	....	br. oz. for...	Few.
9507	U.S.N.M.	2	D2731....	36 45 00 N.; 74 28 00 W.	781	....	gy. oz.......	Few.
9508	U.S.N.M.	1	D2751....	16 54 00 N.; 63 12 00 W.	687	40	bu. glob. oz.	Rare.
9885	U.S.N.M.	1	D2760....	12 07 00 S.; 39 17 00 W.	1,019	39.5	br. co.......	Rare.
9509	U.S.N.M.	5	H58......	17 48 20 N.; 65 35 35 W.	1,345	....	oz. for.......	Few.
9510	U.S.N.M.	5	H60......	17 39 00 N.; 65 44 00 W.	578	....	co. s. for....	Few.
9511	U.S.N.M.	3	H82......	13 29 00 N.; 62 42 40 W.	1,051	....	for.m.bk.sp.	Rare.
9512	U.S.N.M.	5	H86......	12 58 40 N.; 62 48 00 W.	1,635	....	bu. m. for. bk. sp.	Rare.

Genus SYRINGAMMINA H. B. Brady, 1883.

Syringammina H. B. Brady (type, *S. fragillissima* H. B. Brady), Proc. Roy. Soc. London, vol. 35, 1883, p. 155; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 242.—Rhumbler, Arch. Prot., vol. 3, 1903, p. 224.—Pearcey, Trans. Roy. Soc. Edinburgh, vol. 49, 1914, p. 997.

Description.—Test free or adherent, consisting of a bulbous base and many branching arms or of masses of anastomosing tubes in a rounded mass, wall of fine arenaceous particles with a small amount of inorganic cement; apertures at the extremities of the tubular portions.

Two species are known, *S. fragillissima*, dredged by the *Triton* in the Faroe Channel, and *S. minuta* Pearcey, from the Antarctic and probably off the Azores.

SYRINGAMMINA FRAGILLISSIMA H. B. Brady.

Plate 31, figs. 1, 2.

Syringammina fragillissima H. B. Brady, Proc. Roy. Soc. London, vol. 35, 1883, p. 155, pls. 2, 3; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 242, figs. 9*a–c* (in text).—Rhumbler, Arch. Prot., vol. 3, 1903, p. 224, fig. 47 (in text.)

According to Brady this form is as follows:

> Test free, consisting of a rounded mass of branching, inosculating tubes, radiating from a common centre, and arranged in more or less distinct concentric tiers or layers which are marked by the formation at intervals of a network of lateral branches. Walls arenaceous, composed of nearly uniform fine sand, with little or no inorganic cement. Apertures terminal, situated at the peripheral ends of the tubes, closed in with loosely aggregated sand grains. Colour dark gray when wet, drying to a much lighter tint.
>
> Diameter, about 1½ inches (38 mm.).

Distribution.—All that is known of this species are the two specimens dredged by the *Triton* in the Faroe Channel. A very full discussion of these specimens will be found in the *Challenger* Report (vol. 9, 1884, p. 243). The figures and description are from Brady.

Genus JACULELLA H. B. Brady, 1879.

Jaculella H. B. Brady (type, *J. acuta* H. B. Brady), Quart. Journ. Micr. Sci., vol. 19, 1879, p. 35.—Bütschli, in Bronn, Klassen und Ordnungen des Thierreichs, vol. 1, 1880, p. 193.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 255.—Rhumbler, Arch. Prot., vol. 3, 1903, p. 273.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 70.

Description.—Test free, elongate, conical, widest at the apertural end, opposite end typically closed; wall comparatively thick, composed of sand grains firmly cemented, rough on the exterior; aperture formed by the open end of the tube, circular.

Although the tube is closed in complete specimens the distinction between proloculum and second chamber is slight, more definitely shown in some specimens of *J. obtusa* which with their more bulbous basal end may represent the megalospheric form of the species.

From the obtainable data neither of the two species occurs in great numbers, scattered specimens being the rule.

JACULELLA ACUTA H. B. Brady.

Plate 32, figs. 1-4.

Jaculella acuta H. B. Brady, Quart. Journ. Micr. Sci., vol. 19, 1879, p. 35, pl. 3, figs. 12, 13.—Goës, Köngl. Svensk. Vet. Akad. Handl., vol. 19, No. 4, 1882, p. 143, pl. 12, fig. 432.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 255, pl. 22, figs. 14-18.—Goës, Bull. Mus. Comp. Zoöl., vol. 29, 1896, p. 23.—Flint, Rep. U. S. Nat. Mus., 1897 (1899), p. 269, pl. 9, fig. 4.—Rhumbler, Arch. Prot., vol. 3, 1903, p. 273, fig. 122 (in text).—Cushman, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 70, figs. 90, 91 (in text).—Heron-Allen and Earland, Trans. Zool. Soc. London, vol. 20, 1915, p. 609, Trans. Linn. Soc. London, vol. 11, pt. 13, 1916, p. 219.

Description.—Test elongate, straight, tapering, tubular, proximal end closed and acutely pointed, distal end broader, slightly constricted to form the aperture which is circular, wall thick, composed of coarse sand grains, firmly cemented, exterior rough, proximal end of the test often reddish brown, distal portion grayish.

Length variable, up to 25 mm. or even more.

Distribution.—The only North Atlantic stations recorded for this species are off the coasts of Norway and the British Isles and a single station and a single specimen in the Gulf of Mexico recorded by Göes. From the South Atlantic the *Challenger* dredged material from south of Pernambuco, Brazil, 350 fathoms, and off Buenos Aires, 1,900 fathoms.

From the *Albatross* material I have had typical material only from scattered stations all grouped in the region from Georges Banks to the latitude of the Delaware Capes. Specimens occur only in small numbers. Depths range from 852 to 2,045 fathoms, bottom temperatures from 34.4° to 41° F.

Jaculella acuta—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
9704	U.S.N.M.	1	D2036....	38 52 40 N.; 69 24 40 W.	1,735	38	glob. oz......	Rare.
9705	U.S.N.M.	2	D2038....	38 30 30 N.; 69 08 35 W.	2,033	....	glob. oz......	Rare.
9706	U.S.N.M.	1	D2043....	39 49 00 N.; 68 28 30 W.	1,167	38.5	glob. oz......	Rare.
9707	U.S.N.M.	1	D2097....	37 56 20 N.; 70 57 30 W.	1,917	....	glob. oz......	Rare.
9708	U.S.N.M.	3	D2105....	37 50 00 N.; 73 03 50 W.	1,395	41	glob. oz......	Rare.
9354	U.S.N.M.	1	D2226....	37 00 00 N.; 71 54 00 W.	2,045	36.8	glob. oz......	Rare.
9355	U.S.N.M.	3	D2229....	37 38 40 N.; 73 41 30 W.	1,423	37.7	glob. oz......	Rare.
9356	U.S.N.M.	1	D2530....	40 53 30 N.; 66 24 00 W.	956	38.4	gy. oz.......	Rare.
9357	U.S.N.M.	1	D2531....	40 42 00 N.; 66 33 00 W.	852	34.4	gy. m.......	Rare.
9358	U.S.N.M.	1	D2713....	38 20 00 N.; 70 08 30 W.	1,859	....	br. oz.......	Rare.

JACULELLA OBTUSA H. B. Brady.

Plate 32, fig. 5.

Jaculella obtusa H. B. Brady, Proc. Roy. Soc. Edinburgh, vol. 11, 1882, p. 714; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 256, pl. 22, figs. 19–22.—Goës, Köngl. Svensk. Vet. Akad. Handl., vol. 25, No. 9, 1894, p. 20, pl. 4, figs. 87–89; pl. 5, figs. 90, 91; Bull. Mus. Comp. Zoöl., vol. 29, 1896, p. 23.—Rhumbler, Arch. Prot., vol. 3, 1903, p. 273, fig. 123 (in text).—F. Chapman, Journ. Linn. Soc. Zool., vol. 30, 1907, p. 24, pl. 3, fig. 49.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 71, fig. 92 (in text).—Awerinzew, Mem. Acad. Imp. Sci. St. Petersburg, ser. 8, vol. 29, No. 3, 1911, p. 14, pl., fig. 5.—Heron-Allen and Earland, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 41; Trans. Linn. Soc. London, vol. 11, pt. 13, 1916, p. 220.

Description.—Test elongate, straight, tubular, slightly if at all tapering, proximal end closed, obtusely rounded, distal end but slightly broader, its open end forming the aperture; wall thick composed of firmly cemented sand grains, exterior rough; color gray.

Length, 10–15 mm.

Distribution.—From the European side of the Atlantic the species is known from Bergen, Norway; Skagerack (Goës); Faroe Channel (H. B. Brady); several stations west of Scotland; and from the Clare Island region west of Ireland (Heron-Allen and Earland). Awerinzew records it from the Siberian Arctic. It is unrecorded from the western Atlantic. In the *Albatross* and other material I have examined it has occurred at but seven stations just south of 40° N. and around 70° W., with one farther north. Depths range from 1,362 to 1,917 fathoms and bottom temperatures from 36.9° to 41° F. From the northernmost station the depth is but 206 fathoms. From its general distribution it would seem that this species is more characteristic of cooler waters than is its closely related species, *J. acuta*.

Jaculella obtusa—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
9709	U.S.N.M.	2	D2025....	39 26 16 N.; 70 02 37 W.	1,362	....	Glob. oz....	Rare.
9710	U.S.N.M.	2	D2097....	37 56 20 N.; 70 57 30 W.	1,917	....	Glob. oz....	Rare.
9711	U.S.N.M.	1	D2105....	37 50 00 N.; 73 03 50 W.	1,395	41	Glob. oz....	Rare.
9359	U.S.N.M.	1	D2221....	39 05 30 N.; 70 44 30 W.	1,525	36.9	Gy. oz......	Rare.
9360	U.S.N.M.	1	D2222....	39 03 15 N.; 70 50 45 W.	1,537	36.9	Gy. oz......	Rare.
9361	U.S.N.M.	1	D2550....	39 44 30 N.; 70 30 45 W.	1,081	38.5	Br. m.......	Rare.
9362	U.S.N.M.	1	D2697....	47 40 00 N.; 47 35 30 W.	206	....	Gn.m.bk.sp.	Rare.

Genus DENDROPHRYA Str. Wright, 1861.

Dendrophrya Str. Wright (type, *Dendrophrya erecta* Str. Wright), Ann. Mag. Nat. Hist., ser. 3, vol. 8, 1861, p. 133.—Bütschli, in Bronn, Klassen und Ordnungen Thierreichs, vol. 1, 1880, p. 195.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 237.—Rhumbler, Arch. Prot., vol. 3, 1903, p. 220.

Description.—Test attached, consisting of a single chamber, erect or with spreading arms, tubular, irregular or branching, wall arenaceous, with a chitinous base; apertures at the ends of the arms. But a few species are known and these are largely confined to cold waters at comparatively shallow depths.

DENDROPHRYA ERECTA Str. Wright.

Plate 33, figs. 3, 4.

Dendrophrya erecta Str. Wright, Ann. Mag. Nat. Hist., ser. 3, vol. 8, 1861, p. 122, pl. 4, figs. 4–5.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 239, pl. 27A, figs. 7–9.—Rhumbler, Arch. Prot., vol. 3, 1903, p. 221, fig. 45 (in text).

The original description is as follows:

> Test consisting of an attached chamber, with one or more erect branching arms. Basal chamber patelloid or spreading, buried in sand or mud; arms rising either from the margin or from the convex surface, taking the form of irregularly branched chitinous tubes, more or less thickly coated with mud, with pseudopodial apertures at the distal extremities of the branchlets. Height, one-seventh inch (3.5 mm.).

Distribution.—Almost the only records for this and its related species are about the British Isles. The records are Old Granton Quarries, near Edinburgh (Str. Wright); low-tide pools, Cumbrae, Firth of Clyde (Robertson).

In the *Challenger* report Brady gives a very full account of this species. The figures and description are from Brady.

DENDROPHRYA RADIATA Str. Wright.

Plate 31, fig. 3; plate 32, figs. 6, 7.

Dendrophrya radiata Str. Wright, Ann. Mag. Nat. Hist., ser. 3, vol. 8, 1861, p. 122.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 238, pl. 27A, figs. 10–12.—Moebius, Abh. k. pr. Akad. Wiss. Berlin, 1888 (1889), p. 13, pl. 2, figs. 22–27.—Rhumbler, Arch. Prot., vol. 3, 1903, p. 221, fig. 44 (in text).

Brady describes this species as follows:

> Test sessile, depressed; consisting of a central chamber, with spreading, more or less adherent, tubular arms; arms very irregular in contour, often branching, the open distal extremities forming the pseudopodial apertures of the test. Walls chitinous, somewhat thickly coated with mud; central chamber in adult specimens firm and hard. Size very variable, rarely one-fourth inch (6 mm.) in diameter.

Distribution.—The following records are given for this species: Old Granton Quarries, near Edinburgh (Str. Wright); low-tide pools, Cumbrae, Firth of Clyde (Robertson); "quite common along the North Wales coast" (Siddall); Kiel Bay (Rhumbler).

Genus HALIPHYSEMA Bowerbank, 1862.

Haliphysema Bowerbank, Philos. Trans., 1862, p. 1105 (type, *H. tumanowiczii* Bowerbank).—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 280.—Rhumbler, Arch. Prot., vol. 3, 1903, p. 266.

Squamulina (part) Carter, Ann. Mag. Nat. Hist., ser. 4, vol. 6, 1870, p. 346.

Description.—Test attached, with an expanded basal portion, and a columnar erect portion either simple or branched, wall arenaceous, usually with numerous included sponge spicules especially near the tips of the arms or the apertural end of the single chambered species; aperture at the free end of the chamber or at the ends of the branches, partially obscured by the irregular clustering of spicules.

There are several species with very distinct characters.

HALIPHYSEMA TUMANOWICZII Bowerbank.

Plate 33, figs. 1, 2.

Haliphysema tumanowiczii Bowerbank, Philos. Trans., 1862, p. 1105, pl. 73, fig. 3; Monogr. British Sponges, vol. 1, 1864, pl. 30, fig. 359; vol. 2, 1866, p. 76.—E. O. Schmidt, Spongien Adriat. Meeres, Suppl. II, 1866, p. 13, fig. 13.—Haeckel, Jena Zeitschr., vol. 11, 1877, p. 192.—Norman, Ann. Mag. Nat. Hist., ser. 5, vol. 1, 1878, p. 274.—Kent, Ann. Mag. Nat. Hist., ser. 5, vol. 2, 1878, p. 68, pls. 4, 5.—Lankester, Quart. Journ. Micr. Sci., vol. 19, 1879, p. 476, pl. 22, figs. 1-11.—Norman, in Bowerbank, British Sponges, vol. 4, 1882, p. 33.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 281, pl. 27A, figs. 4, 5.—Duerden, Irish Nat., vol. 3, No. 11, 1894, p. 231.—Rhumbler, Arch. Prot., vol. 3, 1903, p. 267, fig. 112 (in text).—Heron-Allen and Earland, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 42; Trans. Zool. Soc., vol. 20, 1915, p. 611; Trans. Linn. Soc. London, vol. 11, pt. 13, 1916, p. 222; Journ. Roy. Micr. Soc., 1916, p. 40.

Squamulina scopula Carter, Ann. Mag. Nat. Hist., ser. 4, vol. 5, 1870, p. 310, pl. 4; vol. 20, 1877, p. 337; ser. 5, vol. 1, 1878, p. 172; vol. 3, 1879, p. 407.—Kent, Ann. Mag. Nat. Hist., ser. 5, vol. 1, 1878, p. 1.

The original description was as follows:

> Test consisting of an unbranched tubular column springing from an adherent disk. Disk convex, spuriously segmented; column straight or variously contorted, narrow at the base, and gradually increasing in diameter toward the distal end, which is either broad and rounded, or takes the form of an inflated or bulbous capitulum. Walls thin, arenaceous, more or less beset with sponge spicules, especially at the distal end.
>
> Length, about one-twentieth of an inch (1.3 mm.).

Distribution.—Shallow water along coasts seems to be the ideal habitat for this species, 25 fathoms seeming to be the deepest record. There are many records of its occurrence about the British Isles and also off Bergen, Norway. Moebius records it from Mauritius and Heron-Allen and Earland from the Kerimba Archipelago off southeastern Africa. There are no records for the western Atlantic. Heron-Allen and Earland make the following remark, which probably accounts for its not being oftener recorded: "The species is probably of world-wide distribution, though the records are scanty, owing to its parasitic habit of growth and extreme friability."

In the material from *Albatross* station D2150, in 382 fathoms, in the Caribbean Sea (13° 34′ 45″ N.; 81° 21′ 10″ W.) (United States National Museum No. 9682), there is a single specimen rather low but with a cylindrical shape, broad base, and the upper portion with the usual crown of spicules seen in this species. The material is white and the whole corresponds very closely with the description of Heron-Allen and Earland of the specimens from the Kerimba Archipelago and with the material obtained by Moebius from Mauritius. The depth of the Atlantic station is deep compared with other records.

HALIPHYSEMA RAMULOSUM Bowerbank.

Plate 34, fig. 1.

Haliphysema ramulosa Bowerbank, Monogr. British Sponges, vol. 2, 1866, p. 79; vol. 3, 1874, p. 33, pl. 13, fig. 1.—Carter, Ann. Mag. Nat. Hist., ser. 4, vol. 5, 1870, p. 389.—Haeckel, Jena Zeitschr., vol. 11, 1877, p. 193.—Norman, Ann. Mag. Nat. Hist., ser. 5, vol. 1, 1878, p. 275; in Bowerbank's Monogr. British Sponges, vol. 4, 1882, p. 38.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 283, pl. 27A, fig. 6.—Rhumbler, Arch. Prot., vol. 3, 1903, p. 268, fig. 114 (in text).—Heron-Allen and Earland, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 41; Journ. Roy. Micr. Soc., 1916, p. 40.

Squamulina scopula "branched variety," Carter, Ann. Mag. Nat. Hist., ser. 4, vol. 6, 1870, p. 345.

Haliphysema capitulatum Moebius, Beil. Tag. 49 Vers. deutsch. naturf. Hamburg, 1876, p. 115.

Haliphysema tumanowiczii Moebius, Beitr. Meeresfauna Insel Mauritius, 1880, p. 72, pl. 1, figs. 1–5; pl. 2, fig. 1.

This form was originally described as follows:

> Test consisting of one or more branching tubular columns springing from an adherent base. Basal portion convex, spreading, or tubular; column straight or irregularly bent, of nearly uniform diameter; branches ascending, somewhat thinner than the column, the distal extremity of each swollen or subglobular. Walls thin, arenaceous, beset with sponge spicules, especially near the distal extremities.
>
> Height, from the base to the summit of the branches, one-tenth to one-fourth inch (2.5 to 6 mm.).

Distribution.—About the British Isles this species seems to occur in various localities as follows Budleigh-Salterton, Devon, between tide marks (Carter); Roundstone Bay, Ireland, on seaweed in shallow water; Guernsey, 15 fathoms (Norman); Cumbrae, low water, rare (Robertson); Clare Island region, Ireland, on Zoophytes and on roots of Laminaria and South Cornwall on Laminaria roots (Heron-Allen and Earland). Schmidt recorded it from material dredged by Pourtales off the coast of Florida. Rhumbler records it from the Kiel Canal and Moebius from Mauritius.

The remarks under the preceding species apply equally well to this.

Subfamily 4. AMMODISCINAE.

Test composed of a globular proloculum and long, undivided tube, closely coiled, either planospirally or in changing planes or to form a spiral test; wall of fine sand with much cement, usually of a reddish or yellowish brown.

Ammodiscus and its allies *Glomospira*, *Ammodiscoides*, and *Turritellella* form a rather unified group in that they are all close coiled and are of fine material, with an abundance of reddish cement. All the tests seem to be free except in the genera *Ammolagena* and *Girvanella*. In some of the species both microspheric and megalospheric forms are known.

Genus AMMOLAGENA Eimer and Fickert, 1899.

Trochammina JONES and PARKER (part) (type *Trochammina irregularis*, var. *clavata* Parker and Jones), Quart. Journ. Geol. Soc., vol. 16, 1860, p. 304.—W. B. CARPENTER, PARKER, and JONES, Introduction to the Study of the Foraminifera, 1862, p. 142.

Webbina H. B. BRADY (part), Proc. Roy. Soc. Edinburgh, vol. 11, 1882, p. 711 (not *Webbina* d'Orbigny, 1839); Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 349.

Ammolagena EIMER and FICKERT, Zeitschr. Wiss. Zool., vol. 65, 1899, p. 673.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 67.—RHUMBLER, Foram. Plankton Exped., Teil 2, 1913, pp. 346, 371.—PEARCEY, Trans. Roy. Soc. Edinburgh, vol. 49, 1914, p. 1003.

Webbinella RHUMBLER (part), Arch. Prot., vol. 3, 1903, pp. 228, 229.

Description.—Test firmly attached, composed of an oval proloculum flattened on the under side and a second tubular chamber of variable length but of nearly uniform diameter, the open end serving as the aperture; wall finely arenaceous, the cement in excess of the sandy particles.

There seems to be no question of the correctness of the use of *Ammolagena* for this genus. Some authors still persist in the use of *Webbina* although its use for this species by Brady is not at all the sense in which d'Orbigny used the name.

AMMOLAGENA CLAVATA (Parker and Jones).

Plate 34, figs. 2–5; plate 35, figs. 1–3.

Trochammina irregularis, var. *clavata* PARKER and JONES, Quart. Journ. Geol. Soc., vol. 16, 1860, p. 304.

Trochammina irregularis (part) W. B. CARPENTER, PARKER, and JONES, Introd. Foram., 1862, p. 142, pl. 11, fig. 6.

Webbina clavata H. B. BRADY, Proc. Roy. Soc. Edinburgh, vol. 11, 1882, p. 711; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 349, pl. 41, figs. 12–16.—H. B. BRADY, PARKER, and JONES, Trans. Zool. Soc., vol. 12, pt. 7, 1888, p. 218, pl. 42, fig. 21.—J. WRIGHT, Proc. Roy. Irish Acad., vol. 1, 1891, p. 470, pl. 20, figs. 2, 3.—GÖES, Köngl. Svensk. Vet. Akad. Handl., vol. 25, No. 9, 1894, p. 32, pl. 6, figs. 245, 246.—CHAPMAN, Proc. Zool. Soc. London, 1895, p. 18.—GÖES, Bull. Mus. Comp, Zoöl., vol. 29, 1896, p. 35.—FLINT, Rep. U. S. Nat. Mus., 1897 (1899), p. 279, pl. 24, fig. 3.—KIAER, Norske Nordhavs Expedition, No. 25, 1899, p. 4.—BAGG, Proc. U. S. Nat. Mus., vol. 34, 1908, p. 129.

Ammolagena clavata EIMER and FICKERT, Zeitschr. Wiss. Zool., vol. 65, 1899, p. 673.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 68, figs. 86–89 (in text).—RHUMBLER, Foram. Plankton Exped., Teil 1, 1911, pp. 93, 96, 197, pl. 1, figs. 1, 2; Teil. 2, 1913, p. 371.—PEARCEY, Trans. Roy. Soc. Edinburgh, vol. 49, 1914, p. 1004.

Webbinella clavata RHUMBLER, Arch. Prot., vol. 3, 1903, p. 229, fig. 55 (in text).

Description.—Test firmly attached, proloculum oval or pyriform, the basal portion flattened by the surface to which it is attached, second chamber elongate, tubular, free or attached, of nearly uniform diameter, when free circular in transverse section, wall thin, of fine sand grains with an excess of yellowish or reddish cement, smooth and polished; open end of the tube serving as the aperture.

Longer diameter of proloculum, 0.5–1.3 mm.

Distribution.—This is one of the most widely distributed species of the family. In general, however, it seems most abundant in warm waters, on the western side of the Atlantic being found in greater numbers in the Gulf of Mexico and the Caribbean Sea than along the coast from Florida to Cape Cod. Scattered stations carry the distribution up the coast to the banks off Cape Cod, but it has not been found in the material from farther north along this coast. Southward it occurs off Bahia, Brazil, and at scattered stations to the Falkland Islands. Specimens have occurred off Greenland, Faroe Channel, off Norway, off Ireland, and in the Mediterranean. Scattered stations in mid-Atlantic give a distribution of the species from the Azores to latitude 40° S.

Specimens attach themselves to various objects, in tropical waters especially to broken shell fragments, in shallow northern waters to pebbles and coarse sand grains, in deep water to the various otoliths that abound and to many other genera of Foraminifera.

Both microscopic and megalospheric specimens occur, the former having a comparatively smaller proloculum but much longer tubular chamber.

Rhumbler mentions that specimens at least occasionally build a definite floor to the proloculum and I have noted a similar condition. The floor over the attachment is, however, usually much thinner than that of the convex surface of the test but not invariably so. The wall of the proloculum usually has a slightly larger proportion of sand particles than the tubular second chamber but in either case the cement predominates. Occasionally there is a second tubular chamber as the opposite side from the usual one, and in one case I have noted there are two tubes apparently side by side from the same point of the proloculum.

Ammolagena clavata—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°*F.*		
9560	U.S.N.M.	5	D2150	13 34 45 N.; 81 21 10 W.	882	45.75	wh. crs. s...	Common.
9561	U.S.N.M.	1	D2217	39 47 20 N.; 69 34 15 W.	924	38.1	gy. m........	Rare.
9562	U.S.N.M.	3	D2383	28 32 00 N.; 88 06 00 W.	1,181	39.8	br. gn. m....	Few.
9563	U.S.N.M.	10+	D2385	28 51 00 N.; 88 18 00 W.	730	40.1	gy. m........	Few.
9564	U.S.N.M.	2	D2392	28 47 30 N.; 87 27 00 W.	724	40.7	br. gy. m....	Few.
9215	U.S.N.M.	1	D2399	28 44 00 N.; 86 18 00 W.	196	51.6	gy. m........	Few.
9216	U.S.N.M.	1	D2581	39 43 00 N.; 71 34 00 W.	394	....	gn. m........	Rare.
9565	U.S.N.M.	2	D2677	32 39 00 N.; 76 50 30 W.	478	39.3	gn. m........	Few.
9566	U.S.N.M.	8	D2678	32 40 00 N.; 76 40 30 W.	731	38.7	lt. gy. oz....	Few.
9567	U.S.N.M.	3	D2679	32 40 00 N.; 76 40 30 W.	782	38.6	lt. gy. oz....	Few.
9217	U.S.N.M.	1	D2751	16 54 00 N.; 63 12 00 W.	687	40	bu. glob. oz.	Few.
9568	U.S.N.M.	1	D2761	15 39 00 S.; 38 32 54 W.	818	39	pter. oz......	Rare.
9218	U.S.N.M.	1	H56	17 44 15 N.; 65 27 50 W.	1,243	....	pter. co. oz. for.	Rare.
9219	U.S.N.M.	1	H82	13 29 00 N.; 62 42 40 W.	1,051	....	for. m. bk. sp.	Rare.
9220	U.S.N.M.	1	H86	12 58 40 N.; 62 48 00 W.	1,635	....	bu. m. for. bk. sp.	Rare.

Genus GIRVANELLA Nicholson and Etheridge, 1878.

Girvanella Nicholson and Etheridge (*Hyperammina vagans* (H. B. Brady)) Monogr. Silur. Foss. Gervais, vol. 1 (1880), 1878, p. 23.—Rhumbler, Foram. Plankton Exped., pt. 2, 1913, pp. 386, 419.

Hyperammina H. B. Brady (part), Quart. Journ. Micr. Sci., vol. 19, 1879, p. 33; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 260.

Tolypammina Rhumbler, Nachr. Köngl. Ges. Wiss. Göttingen, 1895, p. 83; Arch. Prot., vol. 3, 1903, p. 276.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 66.

Serpulella Eimer and Fickert, Zeitschr. Wiss. Zool., vol. 65, 1899, p. 674.

Description.—Test typically adherent by its undersurface, but may become free; consisting of an elongate oval proloculum and a long irregular second chamber, tubular, with nearly even diameter unbranched; composed of sand grains and a large proportion of yellowish or reddish brown cement.

The three species here considered seem to belong to this genus proposed in 1878 by Nicholson and Etheridge for fossil species. From the general characters of the test it is placed under the subfamily Ammodiscinae.

GIRVANELLA VAGANS (H. B. Brady).

Plate 35, figs. 4, 5; plate 36, fig. 1.

Hyperammina vagans H. B. Brady, Quart. Journ. Micr. Sci., vol. 19, 1879, p. 33, pl. 3, fig. 5; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 260, pl. 24, figs. 1–9.—Flint, Rep. U. S. Nat. Mus., 1897 (1899), p. 270, pl. 11, fig. 2.—Chapman and Howchin, Mem. Geol. Surv. N. S. Wales, vol. 14, 1905, p. 6, pl. 2, fig. 1.—Heron-Allen and Earland, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 41, pl. 2, fig. 9; Trans. Zool. Soc. London, vol. 20, 1915, p. 610; Trans. Linn. Soc. London, vol. 11, pt. 13, 1916, p. 221; Journ. Roy. Micr. Soc., 1916, p. 40.

Tolypammina vagans RHUMBLER, Nachr. Köngl. Ges. Wiss. Göttingen, 1895, p. 83; Zeitschr. Allg. Phys., vol. 2, 1902, p. 281, fig. 97; Arch. Prot., vol. 3, 1903, p. 277, figs. 125*a*, *b* (in text).—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 67, figs. 84, 85 (in text).—PEARCEY, Trans. Roy. Soc. Edinburgh, vol. 49, 1914, p. 1004.

Serpulella vagans EIMER and FICKERT, Zeitschr. Wiss. Zool., vol. 65, 1899, p. 674.

Girvanella vagans RHUMBLER, Foram. Plankton Exped., pt. 1, 1911, pl. 4, figs. 1, 2; pt. 2, 1913, p. 419.

Description.—Test adherent, consisting of an oval-elongate proloculum and a long irregularly winding tube of nearly uniform diameter, unbranched; wall composed of sand grains of small size with an abundance of reddish-brown cement; surface smooth, both without and within, aperture formed by the open end of the tubular chamber; color reddish brown, except the growing tip, which is occasionally lighter, the proloculum often darker than the second chamber.

Diameter of tube, 0.05 to 0.2 mm.; length, 1 mm. or much more if the coils were straightened out.

Distribution.—From all the records obtainable this is a very widely distributed species, in the colder Arctic waters occurring in a few fathoms (Brady) to 3,800 fathoms in the *Challenger* North Pacific material. It is known from the Arctic, from the North Sea and about the British Isles, and from deep water of the Atlantic, on the western side recorded by Flint from the Gulf of Mexico. It is known from the Pacific (Brady, Cushman) and from the Antarctic (Pearcey).

In the *Albatross* material I have examined, it has occurred at 36 stations from the latitude of Georges Banks southward along the coast, in the Gulf of Mexico, the Caribbean Sea, north of Panama and just westward of the Lesser Antilles, and off the coast of Brazil. These stations range in depth from 159 to 1,769 fathoms, bottom temperatures from 36.9° to 51.6° F., the highest in the Gulf of Mexico, in depths less than 200 fathoms

There has been much shifting of this species, but it now seems that Rhumbler is correct in assigning it to *Girvanella*, a genus described in 1878 by Nicholson and Etheridge for fossil specimens before *Hyperammina* was described by Brady in 1879. As this species had already been distinguished from *Hyperammina* by later authors it need not affect the standing of the other species still placed under that genus, unless by those authors who still persist in placing *G. vagans* under *Hyperammina*. In such a case they are compelled by rules of nomenclature to use *Girvanella* for the whole genus, unless they reject the affinity of the fossil material.

From the closeness of this genus in the construction of the wall and its general characters, especially those of *G. schaudinii* and *G. frigida*, where the coiling is more regular, it seems advisable to follow Rhumbler and place these species under the subfamily Ammodiscinae, treating *Girvanella* as an uncoiled or irregular form with affinities with *Ammodiscus* and related genera.

Girvanella vagans—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°*F.*		
9645	U.S.N.M.	1	D2035....	39 26 16 N.; 70 02 37 W.	1,362	....	glob. oz.....	Rare.
9646	U.S.N.M.	1	D2036....	38 52 40 N.; 69 24 40 W.	1,735	38	glob. oz.....	Rare.
9647	U.S.N.M.	8	D2041....	39 22 50 N.; 68 25 00 W.	1,608	38	glob. oz.....	Common.
9648	U.S.N.M.	2	D2043....	39 49 00 N.; 68 28 30 W.	1,467	38.5	glob. oz.....	Few.
9649	U.S.N.M.	3	D2062....	39 40 05 N.; 69 21 25 W.	1,098	45	glob. oz.....	Few.
9650	U.S.N.M.	2	D2072....	41 53 00 N.; 65 35 00 W.	858	39	gy. m.......	Few.
9919	U.S.N.M.	10+	D2095....	39 29 00 N.; 70 58 40 W.	1,342	....	glob. oz.....	Few.
9651	U.S.N.M.	2	D2115....	35 49 30 N.; 74 34 45 W.	843	39	m. fne. s....	Few.
9652	U.S.N.M.	2	D2150....	13 34 45 N.; 81 21 10 W.	382	45.75	wh. crs. s...	Few.
9653	U.S.N.M.	5	D2174....	38 15 00 N.; 72 03 00 W.	1,594	....	gy. m.......	Few.
9654	U.S.N.M.	1	D2203....	39 34 15 N.; 71 41 15 W.	705	38.9	gn. m. s.....	Rare.
9655	U.S.N.M.	1	D2206....	39 33 00 N.; 71 16 15 W.	1,178	38.4	gn. m.......	Rare.
9293	U.S.N.M.	4	D2221....	39 05 30 N.; 70 44 30 W.	1,525	36.9	gy. oz.......	Few.
9294	U.S.N.M.	2	D2229....	37 38 40 N.; 73 16 30 W.	1,423	37.7	glob. oz.....	Few.
9295	U.S.N.M.	4	D2234....	39 09 00 N.; 72 03 15 W.	810	38.6	gn. m.......	Few.
9296	U.S.N.M.	2	D2314....	32 43 00 N.; 77 51 00 W.	159	47.4	crs.s. bk. sp. brk. sh.	Few.
9656	U.S.N.M.	1	D2381....	28 05 00 N.; 87 56 51 W.	1,330	....	lt. br. m.....	Rare.
9657	U.S.N.M.	1	D2385....	28 51 00 N.; 88 18 00 W.	730	40.1	gy. m.......	Rare.
9658	U.S.N.M.	1	D2392....	28 47 30 N.; 87 27 00 W.	724	40.7	br. gy. m....	Rare.
9659	U.S.N.M.	1	D2399....	28 44 00 N.; 86 18 00 W.	196	51.6	gy. m.......	Few.
9297	U.S.N.M.	4						
9298	U.S.N.M.	3	D2550....	39 44 30 N.; 70 30 45 W.	1,081	38.5	br. m,.......	Few.
9299	U.S.N.M.	1	D2562....	39 15 30 N.; 71 25 00 W.	1,434	37.3	gy. oz.......	Rare.
9300	U.S.N.M.	2	D2564....	39 22 00 N.; 71 33 30 W.	1,390	37.3	gy. oz.......	Few.
9301	U.S.N.M.	1	D2572....	40 29 00 N.; 66 04 00 W.	1,769	37.8	gy. oz.......	Rare.
9924	U.S.N.M.	2	D2651....	24 02 00 N.; 77 12 45 W.	97	73.4	wh. oz......	Rare.
9660	U.S.N.M.	3	D2678....	32 40 00 N.; 76 40 30 W.	731	38.7	lt. gy. oz....	Few.
9302	U.S.N.M.	2	D2682....	39 38 00 N.; 70 22 00 W.	1,004	....	gn. m. s.....	Few.
9303	U.S.N.M.	1	D2714....	38 22 00 N.; 70 17 30 W.	1,825	....	br. oz.......	Rare.
9304	U.S.N.M.	10+	D2716....	38 29 30 N.; 70 57 00 W.	1,631	....	br. oz. for...	Common.
9305	U.S.N.M.	2	D2751....	16 54 00 N.; 63 12 00 W.	687	40	bu. glob. oz.	Few.
9661	U.S.N.M.	1	D2760....	12 07 00 S.; 37 17 00 W.	1,019	39.5	br. co.......	Few.
9306	U.S.N.M.	1	H56......	17 44 15 N.; 65 27 50 W.	1,243	....	pter. co. oz. for.	Few.
9351	U.S.N.M.	2	H58......	17 48 20 N.; 65 35 35 W.	1,345	....	co. s. for.....	Few.
9302	U.S.N.M.	1	H60......	17 39 00 N.; 65 44 00 W.	578	....	co. s. for.....	Rare.
9307	U.S.N.M.	1	H79......	14 20 30 N.; 63 10 00 W.	821	....	co. s. sh. for.	Rare.
9308	U.S.N.M.	1	H88......	12 29 00 N.; 62 38 30 W.	1,630	....	m. bk. sp. for	Rare.

GIRVANELLA FRIGIDA, new species.

Description.—Test small, attached, early portion irregularly coiled, later portion irregularly placed; wall composed largely of reddish-brown cement with a comparatively small amount of fine arenaceous material; aperture at the open end of the tubular chamber; color reddish brown.

Diameter of entire test rarely over 0.5 mm.

Distribution.—Type-specimen (U.S.N.M. No. 9912) from Speedwell station 219 off Cape Ann in 32 fathoms. It was also obtained in the same region station 236 in 28 fathoms and 2 *Albatross* stations. It occurs on rock specimens from off Halifax Harbor and seems to be common on rocks on the New England coast in cold water.

This is much smaller than *G. vagans* and is usually somewhat roughly coiled at the beginning before it starts its irregular winding course over the rock to which it is attached. It appears to be characteristic of the surface of dredged rocks off the New England coast.

Girvanella frigida—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
9913	U.S.N.M.	10+	D2456....	47 29 00 N.; 52 18 00 W.	86	....	g............	Common.
9921	U.S.N.M.	10+	D2466....	45 29 00 N.; 55 24 00 W.	67	30	cs...........	Common.
9912	....	10+	Speedwell 219.......	42 30 00 N.; 70 33 00 W.	32	55.5	rky.........	Common.
9916	....	10+	236.......	42 28 00 N.; 70 31 00 W.	28	48.5	rky. crs. s...	Common.

GIRVANELLA SCHAUDINNI (Rhumbler).

Plate 36, fig. 2.

?*Hyperammin vagans* H. B. Brady (part), Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 260, pl. 24, figs. 7–9 (not figs. 1–6).

Tolypammina schaudinni Rhumbler, Arch. Prot., vol. 3, 1903, p. 277, fig. 126.

Girvanella schaudinni Rhumbler, Foram. Plankton-Exped., pt. 1, 1911, pl. 4, figs. 3, 4; pt. 2, 1913, p. 420.

Description.—Test free at least in the adult, very irregularly coiled, wall with a chitinous inner layer, the main wall composed of sand grains with an abundance of yellowish or reddish brown cement; aperture formed by the open end of the second or tubular chamber.

Diameter, 0.1–0.3 mm. or more.

Distribution.—Type station for this species is from the Plankton-Expedition stations south of Boavista, Cape Verde Islands, 50–160 meters, and also recorded later by Rhumbler from off the Hebrides in 1,524 meters.

In the *Albatross* material I have had material seemingly referable to this species from three stations southwestward from Cape Cod, D2222, in 1,537 fathoms, bottom temperature 36.9° F.; D2229, in 1,423 fathoms, bottom temperature 37.7° F., and D2234, in 810 fathoms, bottom temperature 38.6° F.

This species tends to show a connection toward such species as *Turritellella spectabilis* in its irregularity of coiling and at the same time on the other hand is surely related to the more typical species of *Girvanella*.

Girvanella schaudinii—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
9290	U.S.N.M.	2	D2222....	39 03 15 N.; 70 50 45 W.	1,537	36.9	gy. oz.......	Rare.
9291	U.S.N.M.	1	D2229....	37 38 40 N.; 73 16 30 W.	1,423	37.7	glob. oz.....	Rare.
9292	U.S.N.M.	3	D2234....	39 09 00 N.; 72 03 15 W.	810	38.6	gn. m.......	Rare.

Genus AMMODISCUS Reuss, 1861.

Operculina (part) d'Orbigny, in De la Sagra, Hist. Fis. Pol. Nat. Cuba, 1839, p. 49.

Orbis Strickland, Quart. Journ. Geol. Soc., vol. 2, 1848, p. 30 (not *Orbis* of Philippi-*Cornuspira*).

Spirillina Williamson, Rec. Foram. Great Britain, 1858, p. 93 (not *Spirillina* Ehrenberg, 1841).

Trochammina (part) Jones and Parker, Quart. Journ. Geol. Soc., vol. 16, 1860, p. 304.—W. B. Carpenter, Parker, and Jones, Introd. Foram., 1862, p. 141.

Ammodiscus (part) Reuss, Sitz. Akad. Wiss. Wien., vol. 44 (1), 1861 (1862), p. 365 (*Type*, *A. incertus* (d'Orbigny)).—Bütschli, in Bronn, Klassen und Ordnungen des Thierreichs, vol. 1, 1880, p. 189.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 329.—Rhumbler, Nachr. Ges. Wiss. Göttingen, 1895, p. 84.—Eimer and Fickert, Zeitschr. Wiss. Zool., vol. 65, 1899, p. 614.—Rhumbler, Arch. Prot., vol. 3, 1903, p. 280.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 73.—Rhumbler, Foram. Plankton Exped., pt. 2, 1913, p. 387.

Cornuspira (part) Reuss and various authors (not *Cornuspira* Schultze).

Involutina (part) Terquem, Mém. Acad. Imp. Metz, 1860–61 (1862), p. 450; 1862–63 (1863), p. 221.

Description.—Test free, planospiral, composed of a globular proloculum and long, undivided tubular second chamber, coiled regularly in one plane; wall finely arenaceous, cement yellowish or reddish brown, surface smooth, aperture formed by the open end of the chamber.

As here used, *Ammodiscus* is restricted to include those species in which the test is typically planospiral throughout.

AMMODISCUS INCERTUS (d'Orbigny).

Plate 39.

Operculina incerta d'Orbigny, in De la Sagra, Hist. Fis. Pol. Nat. Cuba, 1839, "Foraminifères," p. 49, pl. 6, figs. 16, 17; Spanish Edit., 1840, p. 71, pl. 6, figs. 16, 17.

Spirillina arenacea Williamson, Rec. Foram. Great Britain, 1858, p. 93, pl. 7, fig. 203.

Trochammina squamata, var. *incerta* Jones and Parker, Quart. Journ. Geol. Soc., vol. 16, 1860, p. 304.—Parker and Jones, Appendix to W. B. Carpenter, Parker, and Jones, Intr. Foram., 1862, p. 312.

Trochammina incerta W. B. Carpenter, Parker, and Jones, Intr. Foram., 1862, p. 141, pl. 11, fig. 2.—Haeusler, Ann. Mag. Nat. Hist., ser. 5, vol. 10, 1882, p. 52, pl. 3.

Ammodiscus incertus H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 330, pl. 38, figs. 1–3.—Sherborn and Chapman, Journ. Roy Micr. Soc., 1889, p. 484, pl. 11, fig. 7.—Burrows, Sherborn, and Bailey, Journ. Roy. Micr. Soc., 1890, p. 552, pl. 8, fig. 8.—J. Wright, Proc. Roy. Irish Acad., vol. 1, 1891, p. 468.—Chapman, Journ. Roy. Micr. Soc., 1892, p. 326, pl. 6, fig. 11.—Egger, Abh. bay. Akad. Wiss. München, vol. 18, 1893, p. 263, pl. 5, figs.

35, 36.—Göes, Kongl. Svensk. Vet. Akad. Handl., vol. 25, No. 9, 1894, p. 31, pl. 6, figs. 238, 239.—Chapman, Proc. Zool. Soc. London, 1895, p. 17; Ann. Mag. Nat. Hist., ser. 6, vol. 16, 1895, p. 315, pl. 11, figs. 8, 9.—Göes, Bull. Mus. Comp. Zoöl., vol. 29, 1896, p. 34 (part).—Flint, Rep. U. S. Nat. Mus., 1897 (1899), p. 278, pl. 23, fig. 2.—Millett, Journ. Roy. Micr. Soc., 1899, p. 362.—Eimer and Fickert, Zeitschr. Wiss. Zool., vol. 65, 1899, p. 614, fig. 32 (in text).—Rhumbler, Zeitschr. Allg. Phys., vol. 2, 1902, p. 1, fig. 18; Arch. Proc., vol. 3, 1903, p. 280, fig. 129 (in text).—Sidebottom, Mem. and Proc. Manchester Lit. and Philos. Soc., vol. 49, No. 5, 1905, p. 5.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 73, figs. 85, 86 (in text).—Heron-Allen and Earland, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 49.—Pearcey, Trans. Roy. Soc. Edinburgh, vol. 49, 1914, p. 1005.—Heron-Allen and Earland, Trans. Linn. Soc. London, vol. 11, pt. 13, 1916, p. 225.

Ammodiscus tenuis H. B. Brady, Quart. Journ. Micr. Sci., vol. 21, 1881, p. 51; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 332, pl. 38, figs. 4–6.—Goës, Köngl. Svensk. Vet. Akad. Handl., vol. 25, No. 9, 1894, p. 31, pl. 6, figs. 240, 241.—Chapman, Proc. Zool. Soc. London, 1895, p. 18.—Flint, Rep. U. S. Nat. Mus., 1897 (1899), p. 279, pl. 23, fig. 1.—Rhumbler, Arch. Prot., vol. 3, 1903, p. 281, fig. 130 (in text).—Heron-Allen and Earland, Trans Zool. Soc., vol. 20, 1915, p. 618.

Description.—Test free, planospiral, composed of an ovoid proloculum followed by a long, spirally coiled, undivided second chamber in a single plane, in the microspheric form coils very small in the center and gradually increasing toward the periphery, in the megalospheric form coils much larger in the central portion and increasing but little toward the peripheral region; adult with the outer whorls about as wide as high in transverse section; wall finely arenaceous, usually with an excess of cement; color usually yellowish or reddish brown in fresh specimens or in alcoholic ones often with the area about the aperture whitish; aperture formed by the open end of the chamber.

Diameter of test, up to 6 mm.

Distribution.—This is a very widely distributed species. It has been found in all the great oceans except the Arctic, Pearcey recording it in his paper from the Antarctic. It is recorded from the Mediterranean. In the Atlantic it is now known from the coasts of France, Belgium, and the British Isles; from the North Sea; shores of Norway and Sweden. This side of the Atlantic it has occurred in material from Newfoundland southward, in the Gulf of Mexico and Caribbean Sea as well as off the eastern coast of South America near Bahia, Brazil.

Most of the Atlantic records are from water less than a thousand fathoms, the deepest 1,350 fathoms. Most of the *Albatross* material dredged off our coast is from between 500 and 1,000 fathoms in depth. Most of the bottom temperatures range between 38.6° and 40.6° F.

Both the microspheric and megalospheric forms are usually found at the same station. The latter is the *A. tenuis* of Brady. Usually in the Atlantic material, as elsewhere, the megalospheric form is the more common but does not attain the size that the adult microspheric form does.

In connection with the bottom temperatures and distribution it seems that this species is more abundant under rather cold conditions. As a result it is not surprising to find that in the cold area along our eastern coast it is much more frequently met with than in material from farther south.

Ammodiscus incertus—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
9544	U.S.N.M.	1	D2003....	37 16 30 N.; 74 20 36 W.	641	....	....	Rare.
9545	U.S.N.M.	2	D2036....	38 52 40 N.; 69 24 40 W.	1,735	38	glob. oz.....	Few.
9546	U.S.N.M.	1	D2048....	40 02 00 N.; 68 50 30 W.	547	39	crs. m. g....	Rare.
9547	U.S.N.M.	3	D2115....	35 49 30 N.; 74 34 45 W.	843	39	m. fne. s.....	Few.
9548	U.S.N.M.	1	D2144....	9 49 00 N.; 79 31 30 W.	896	....	gn. m.......	Rare.
9549	U.S.N.M.	2	D2171....	37 59 30 N.; 73 48 40 W.	444	39.5	gn. m.......	Rare.
9550	U.S.N.M.	2	D2202....	39 38 00 N.; 71 39 45 W.	515	39.1	gn. m.......	Few.
9551	U.S.N.M.	4	D2203....	39 34 15 N.; 71 41 15 W.	705	38.9	gn. m. s.....	Few.
9552	U.S.N.M.	1	D2213....	39 58 30 N.; 70 30 00 W.	384	39.5	gn. m.......	Rare.
9203	U.S.N.M.	1	D2214....	39 57 00 N.; 70 32 00 W.	475	39.5	gn. m.......	Few.
9204	U.S.N.M.	9	D2234....	39 09 00 N.; 72 03 15 W.	810	38.6	gn. m.......	Few.
9205	U.S.N.M.	2	D2237....	39 12 17 N.; 72 09 30 W.	520	39.5	gn. m.......	Rare.
9552	U.S.N.M.	8	D2242....	40 15 30 N.; 70 27 00 W.	58	51.4	gn. m.......	Few.
9554	U.S.N.M.	1	D2263....	37 08 00 N.; 74 33 00 W.	430	....	gn. m.......	Rare.
9556	U.S.N.M.	5	D2385....	28 51 00 N.; 88 18 00 W.	730	40.1	gy. m.......	Rare.
9206	U.S.N.M.	1	D2400....	28 41 00 N.; 86 07 00 W.	169	....	gy. m.......	Rare.
9207	U.S.N.M.	4	D2504....	44 23 00 N.; 61 22 45 W.	82	40.6	bk. m. g.....	Rare.
9208	U.S.N.M.	10+	D2547....	39 54 30 N.; 70 20 00 W.	390	39.6	gy. oz.......	Abundant.
9209	U.S.N.M.	2	D2550....	39 44 30 N.; 70 30 45 W.	1,081	38.5	br. m.......	Few.
9210	U.S.N.M.	1	D2552....	39 47 07 N.; 70 35 00 W.	721	39.6	gy. oz.......	Rare.
9211	U.S.N.M.	1	D2581....	39 43 00 N.; 71 34 00 W.	394	....	gn. m.......	Rare.
9557	U.S.N.M.	1	D2677....	32 39 00 N.; 76 50 30 W.	478	39.2	gn. m.......	Rare.
9558	U.S.N.M.	10	D2678....	32 40 00 N.; 76 40 30 W.	731	38.7	lt. gy. oz....	Few.
9559	U.S.N.M.	8	D2679....	32 40 00 N.; 76 40 30 W.	782	38.6	lt. gy. oz....	Few.
9212	U.S.N.M.	10+	D2680....	39 50 00 N.; 70 26 00 W.	555	....	....	Frequent.
9213	U.S.N.M.	1	D2729....	36 36 00 N.; 74 32 00 W.	679	....	dk. gn. m...	Rare.
9214	U.S.N.M.	1	....	Off Wiskon Rocks, off Key West, Fla.	144	....	....	Rare.

Genus AMMODISCOIDES Cushman, 1909.

Ammodiscoides Cushman, Pros. U. S. Nat. Mus., vol. 36, 1909, p. 424 (type. *Ammodiscoides turbinatus* Cushman).—Rhumbler, Foram. Plankton-Exped., pt. 2, 1913, p. 388.

Description.—Test free, spiral, initial chamber followed by a coiled nonseptate tube the microspheric form at least, with the early portion forming a hollow cone; later portions becoming broadly flaring usually slightly concave in the opposite direction from that of the early conical portion, wall finely arenaceous, smooth, aperture terminal.

This genus was split off from *Ammodiscus*, which is planospiral both in the early stages and the later whorls as well while *Ammodiscoides* has a definite conical young and broadly flaring later development.

In the material examined there are megalospheric specimens which occur with typical microspheric ones but which do not show as clearly the early conical condition. This is in conformity with so many genera that show the full characters only in the microspheric form and which in the megalospheric form do not show these as well,

The extension of range of this genus from its earliest discovery is noted under the distribution of the type species.

AMMODISCOIDES TURBINATUS Cushman.

Plate 36, figs. 3–6; plate 37.

Ammodiscoides turbinatus Cushman, Proc. U. S. Nat. Mus., vol. 36, 1909, p. 424, pl. 33, figs. 1–6.—Rhumbler, Foram. Plankton-Exped., pt. 2, 1913, p. 388, text figs. 124*a*, *d*.

Description.—Test in the microspheric form with a proloculum followed by a long, coiled, nonseptate chamber, in the young forming a hollow cone of about 10 coils. The whorls of nearly uniform diameter, later portion broadly flaring, concave, whorls increasing in diameter toward the periphery, peripheral edge somewhat flattened; wall of fine sand grains with a chitinous cement, surface smooth, of a dark reddish brown color; aperture low and broad, quadrangular, without a definite lip.

Maximum diameter of microspheric specimens, 3 mm.

Distribution.—The type station for this species is *Albatross* D2383. in the northern portion of the Gulf of Mexico, in 1,181 fathoms. The specimens from this station were found in material selected by Goës under the name *Ammodiscus incertus*. In a reexamination of the unsorted material from this station other specimens were found. Also it has been found in material from six other stations in the same general region; D2377, 210 fathoms, bottom, temperature 67° F.; D2384, 940 fathoms, bottom temperature 39.6° F.; D2385, 730 fathoms, bottom, temperature 40.1° F.; D2393, 525 fathoms, bottom temperature 41.1° F.; D2398, 227 fathoms, bottom temperature 48.6° F.; and D2399, 196 fathoms, bottom temperature 51.6° F. Widely separated from this general area specimens occurred at D2760, in 1,019 fathoms, bottom temperature 39.5° F., off the eastern coast of South America, near Bahia, Brazil.

The species seems to be limited to this distribution and southern in its tendencies. It has not been found in any of the abundant material off the eastern coast of North America from Florida to Newfoundland nor in the other portions of the Gulf of Mexico or the Caribbean Sea from which material has been examined.

It is also worthy of note that the species does not seem to occur usually with *Ammodiscus incertus*.

Ammodiscoides turbinatus—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
9538	U.S.N.M.	9	D2377....	27 07 30 N.; 88 08 00 W.	210	67	gy. m.......	Few.
9539	U.S.N.M.	10+	D2383....	28 32 00 N.; 88 06 00 W.	1,181	39.8	br. gn. m....	Common.
9540	U.S.N.M.	1	D2384....	28 45 00 N.; 88 15 30 W.	940	39.6	br. gn. m....	Rare.
9541	U.S.N.M.	10+	D2385....	28 51 00 N.; 88 18 00 W.	730	40.1	gy. m.......	Common.
9202	U.S.N.M.	2	D2393....	28 43 00 N.; 87 14 30 W.	525	41.1	lt. gy. m....	Rare.
9542	U.S.N.M.	2	D2398....	28 45 00 N.; 86 26 00 W.	227	48.6	gy. m.......	Few.
9201	U.S.N.M.	2	D2399....	28 44 00 N.; 86 18 00 W.	196	51.6	gy. m.......	Few.
9543	U.S.N.M.	3	D2760....	12 07 00 S.; 37 17 00 W.	1,019	39.5	br. co.......	Few.

Genus GLOMOSPIRA Rzehak, 1888.

Trochammina (part) Jones and Parker, Quart. Journ. Geol. Soc., vol. 61, 1860, p. 304.

Ammodiscus (part) Siddall, Cat. Brit. Foram., 1879, p. 5.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol 9, 1884, p. 333.

Glomospira Rzehak, Verh. k. k. geol. Reichs., 1888, p. 191 (type, *Trochammina gordialis* Jones and Parker).—Schubert (part), Jahrb. k. k. geol. Reichs., vol. 58, 1908, p. 380.—Rhumbler, Plankton Exped., Foraminiferen, pt. 2, 1913, p. 387, 421.

Gordiammina Rhumbler, Nachr. Ges. Wiss. Göttingen, 1895, p. 84; Arch. Prot., vol. 3, 1903, p. 281.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 76.—Pearcey, Trans. Roy. Soc. Edinburgh, vol. 49, 1914, p. 1005.

Description.—Test composed of a subglobular proloculum and long, undivided second chamber, winding upon itself in various planes, not completely spiral throughout, wall finely arenaceous, with a predominance of cement, smooth both without and within, color reddish or yellowish brown.

From the original references, *Glomospira* Rzehak must be used for this genus instead of *Gordiammina* Rhumbler. There are two recent species.

GLOMOSPIRA GORDIALIS (Jones and Parker).

Plate 36, figs. 7–9.

Trochammina squamata, var. *gordialis* Jones and Parker, Quart. Journ. Geol. Soc., vol. 16, 1860, p. 304.—Parker and Jones, Philos. Trans., vol. 155, 1865, p. 408, pl. 15, fig. 32.

Trochammina gordialis W. B. Carpenter, Parker, and Jones, Intr. Foram., 1862, p. 141, pl. 11, fig. 4.—Jones, Parker, and Kirby, Ann. Mag. Nat., Hist., ser. 4, vol. 4, 1869, p. 390, pl. 13, figs. 7, 8.—Wright, Proc. Belfast Field Club, 1876–77 (App.), pl. 4, fig. 3.—Haeusler, Ann. Mag. Nat. Hist., ser. 5, vol. 10, 1882, p. 55, pls. 3 and 4, figs. 8–20.

Trochammina (*Ammodiscus*) *gordialis* Haeusler, Neues Jahrb., 1883, p. 59, pl. 4, figs. 2, 3.

Ammodiscus gordialis Siddall, Cat. Brit. Rec. For., 1879, p. 5.—Bütschli, in Bronn's Klassen und Ordnungen des Thierreichs, vol. 1, 1880, p. 196, pl. 5, fig. 22.—H. B. Brady, Denkschr. Akad. Wiss. Wien, vol. 42, 1881, p. 100; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 333, pl. 38, figs. 7–9.—Haeusler, Neues Jahrb., Beil., vol. 4, 1885, p. 24, pl. 3, figs. 10–22, 31.—H. B. BRADY, PARKER, and JONES, Trans. Zool. Soc., vol. 12, 1888, p. 218, pl. 42, fig. 22.—J. WRIGHT, Proc. Roy. Irish Acad., vol. 1, 1891, p. 469.—EGGER, Abh. bay. Akad. Wiss. München, vol. 18, 1893, p. 264, pl. 5, figs. 39, 40.—FLINT, Rep. U. S. Nat. Mus., 1897 (1899), p. 279, pl. 24, fig. 1.

Ammodiscus (*Glomospira*) *gordialis* RZEHAK, Verh. k. k. geol. Reichs., 1888, p. 191.

Gordiammina gordialis RHUMBLER, Nachr. Ges. Wiss. Göttingen, 1895, p. 84; Arch. Prot., vol. 3, 1903, p. 282, fig. 132 (in text).—CUSHMAN, Bull. 71. U. S. Nat. Mus., pt. 1, 1910, p. 76, figs. 88–90 (in text).—PEARCEY, Trans, Roy. Soc. Edinburgh, vol. 49, 1914, p. 1005.

Description.—Test composed of a subglobular proloculum and long undivided second chamber, at first planospiral like *Ammodiscus*, but soon leaving the one plane and becoming irregularly coiled; wall of fine arenaceous material with cement predominating; color reddish or yellowish brown.

Diameter, 0.25 to 0.90 mm.

Distribution.—This is more common than *G. charoides* and is very widely distributed. It is not found in any great numbers, however. It is known from the Arctic, from the coasts of Great Britain and France, the Mediterranean, South Atlantic, and on the western side of the North Atlantic from off Nantucket Shoals, *Albatross* D2041, 1,608 fathoms, and south of Marthas Vineyard, D2568, in 1,781 fathoms. I have seen material from seven other *Albatross* stations, four in the same general region, one off Havana, Cuba, one in the northern part of the Gulf of Mexico, and the other off Pernambuco, Brazil. Depths range from 167 to 1,608 fathoms, bottom temperatures from 36.9° to 39° F., with a single station in the Gulf of Mexico 48.6° in 227 fathoms.

Glomospira gordialis—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
9640	U.S.N.M.	1	D2029....	39 42 00 N.; 70 47 00 W.	1,168	38.5	gy. m.......	Rare.
10035	U.S.N.M	1	D2035....	39 26 16 N.: 70 02 37 W.	1,362	....	glob. oz.....	Rare.
9641	U.S.N.M.	1	D2034....	39 27 10 N.; 69 56 20 W.	1,346	38	glob. oz.....	Rare.
9642	U.S.N.M.	2	D2160....	23 10 31 N.; 82 20 37 W.	167	....	co...........	Rare.
9313	U.S.N.M.	1	D2221....	39 05 30 N.; 70 44 30 W.	1,525	36.9	gy. oz.......	Rare.
9314	U.S.N.M.	1	D2222....	39 03 15 N.; 70 50 45 W.	1,537	36.9	gy. oz.......	Rare.
9315	U.S.N.M.	1	D2393....	28 43 00 N.; 87 14 30 W.	525	41.1	lt. gy. m....	Rare.
9643.	U.S.N.M.	4	D2398....	28 45 00 N.; 86 26 00 W.	227	48.6	gy. m.......	Rare.
9644	U.S.N.M.	1	D2761....	15 39 00 S.; 38 32 54 W.	818	39	pter. oz.....	Rare.
9353	U.S.N.M.	1	H58......	17 45 20 N.; 65 35 35 W.	1,345	....	oz. for.......	Rare.

GLOMOSPIRA CHAROIDES (Jones and Parker).

Plate 36, figs. 10–15.

Trochammina squamata, var. *charoides* JONES and PARKER, Quart. Journ., Geol. Soc., vol. 16, 1860, p. 304.

Trochammina charoides W. B. CARPENTER, JONES, and PARKER, Intr. Foram., 1862, p. 141, pl. 11, fig. 3.—SIDDALL, Proc. Chester Soc. Nat. Sci., pt. 2, 1878, p. 5.—HAEUSLER, Ann. Mag. Nat. Hist., ser. 5, vol. 10, 1882, p. 56, pl. 4, fig. 21.

Ammodiscus charoides Berthelin, Foram. de Bourgneuf et Pornichet, 1878, p. 23, No. 18.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 334, pl. 38, figs. 10–16.—J. Wright, Proc. Roy. Irish Acad., vol. 1, 1891, p. 469.—Chapman, Proc. Zool. Soc. London, 1895, p. 18.—Flint, Rep. U. S. Nat. Mus., 1897 (1899), p. 279, pl. 24, fig. 2.

Gordiammina charoides Rhumbler, Nachr. Ges. Wiss. Göttingen, 1895, p. 84.—Kiaer, Norske Nordhavs Expedition, No. 25, 1899, p. 4.—Rhumbler, Arch. Prot., vol. 3, 1903, p. 282, fig. 133 (in text).—Cushman, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 77, figs. 91–96 (in text).—Pearcey, Trans. Roy. Soc. Edinburgh, vol. 49, 1914, p. 1005.

Glomospira charoides Rhumbler, Foram. Plankton Exped., pt. 1, 1909, pl. 4, fig. 8; pt. 2, 1913, p. 422.

Description.—Test consisting of an ovoid or subglobular proloculum and long, undivided second chamber evenly coiled in a series of layers making a subglobular mass, then turning at right angles to its preceding axis and making finally a partial or even complete revolution about the earlier formed globular test; wall finely arenaceous with a predominance of cement; surface smooth and polished; color usually reddish brown.

Diameter, up to 0.5 mm.

Distribution.—This is a very widely distributed species, never so far as I have seen, occurring in any considerable numbers. On the European side it is known from the Mediterranean, Bay of Biscay, Faroe Channel, and west of Scotland and about the British Isles. Flint records a single station, D2041, 1,608 fathoms, south of Georges Banks, and I have found the species in the same general region at the same station and at several other *Albatross* stations.

Glomospira charoides—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
	U.S.N.M.	1	D2036....	38 52 40 N.; 69 24 40 W.	1,735	38	glob. oz.....	Rare.
9630	U.S.N.M.	....	D2041....	39 22 50 N.; 68 25 00 W.	1,608	38	glob. oz.....	Rare.
9309	U.S.N.M.	1	D2221....	39 05 20 N.; 70 44 30 W.	1,525	36.9	gy. oz.......	Rare.
9310	U.S.N.M.	2	D2222....	39 03 15 N.; 70 50 45 W.	1,537	36.9	gy. oz.......	Rare.
9311	U.S.N.M.	4	D2393....	28 43 00 N.; 87 14 30 W.	525	41.1	lt. gy. m....	Rare.
9312	U.S.N.M.	2	D2550....	39 44 30 N.; 70 30 45 W.	1,081	38.5	br. m.......	Few.

Genus TURRITELLELLA Rhumbler, 1903.

Trochammina (part) Siddall (type, *Trochammina shoneana* Siddall), Proc. Chester Soc. Nat. Sci., pt. 2, 1878, p. 46.

Ammodiscus (part) Siddall, Cat. Brit. Foram., 1879, p. 5.—Balkwill and Millett, Journ. Micr., vol. 3, 1884, p. 25.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 335.

Turritellopsis Rhumbler (not of G. O. Sars, 1878), Nachr. Ges. Wiss. Göttingen, 1895, p. 84.

Turritellella Rhumbler, Arch. Prot., vol. 3, 1903, p. 283.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 78.

Description.—Test free, consisting of a proloculum and long, undivided second chamber, coiled in an elongate, close spiral, wall composed of sand grains and much cement, smooth; aperture, the open end of the tubular chamber.

Recognizing the considerable differences between these and the other species included under *Ammodiscus*, Rhumbler proposed *Turritellella* for the species following. It seems very distinctive and may include *T. spectabilis* (H. B. Brady).

TURRITELLELLA SHONEANA (Siddall).

Plate 38, figs. 5–7.

Trochammina shoneana Siddall, Proc. Chester Soc. Nat. Sci., pt. 2, 1878, p. 46, figs. 1, 2.

Ammodiscus shoneanus Siddall, Cat. Brit. For., 1879, p. 5.—Balkwill and Wright, Proc. Roy. Irish Acad., vol. 3, 1882, p. 546; Journ. Micr., vol. 3, 1884, p. 25, pl. 1, fig. 4.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 335, pl. 38, figs. 17–19.—Heron-Allen and Earland, Proc. Roy. Irish Acad., vol. 31, No. 64, 1913, p. 49, pl. 3, fig. 6; Trans. Linn. Soc. London, vol. 11, pt. 13, 1916, p. 227.

Turritellopsis shoneanus Rhumbler, Nachr. Ges. Wiss. Göttingen, 1895, p. 84; Zeitschr. allg. Phys., vol. 2, 1902, p. 284, fig. 103.

Turritella shoneana Rhumbler, Arch. Prot., vol. 3, 1903, p. 283, fig. 135 (in text).—Cushman, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 79, figs. 107–109 (in text).

Description.—Test free, composed of a proloculum and a long undivided tubular second chamber, in a close coiled, elongate spiral, of nearly uniform diameter, wall finely arenaceous, with much cement, rounded open end of the tubular chamber serving as the aperture, color reddish brown.

Length, 0.25–0.5 mm.

Distribution.—In the North Sea and about the British Isles this species has been recorded a number of times in comparatively shallow water. Rhumbler records it from comparatively shallow water off the Cape Verde Islands. The *Challenger* obtained it from comparatively shallow water off Kerguelen Island and again in very deep water of the North Pacific, 3,950 fathoms. I have material kindly sent me by Mr. Joseph Wright, of Belfast, Ireland, from Rockport, Belfast Lough, between tides, but I have found no specimens in the material I have examined from this side of the Atlantic.

Heron-Allen and Earland mention the finding of the megalospheric form only in the Clare Island region and the fact that the material figured in part by Brady seems to be microspheric.

TURRITELLELLA SPECTABILIS (H. B. Brady).

Plate 38, figs. 1–4.

Ammodiscus spectabilis H. B. Brady, Quart. Journ. Micr. Sci., vol. 21, 1881, p. 51; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 336, pl. 38, figs. 20–22.

Turritellella spectabilis Rhumbler, Arch. Prot., vol. 3, 1903, p. 283, fig. 134 (in text).

This species is described by Brady as follows:

> Test free; composed of a nonseptate tube wound upon itself, not regularly and symmetrically, so as to retain a rectilinear contour, but in curved or twisted fashion, so as to form an arcuate or subhelicoid test. Shell wall very thin; exterior somewhat rough, interior smooth and polished. Longer diameter, one-fifth inch (5 mm.) or more.

Distribution.—The types of the species are from one of the *Porcupine* stations, in 358 fathoms, off the British Isles and similar specimens more or less injured and therefore not clearly identifiable from the *Challenger* material in the south Atlantic off Buenos Aires in 1,900 fathoms.

The figured specimen (pl. 38, fig. 1) is from the type station in the collection of the United States National Museum received from Doctor Carpenter.

The large size with the thin fragile test and peculiar type of irregular coiling distinguish it from other known species.

EXPLANATION OF PLATES.

Plate 1.

Fig. 1. *Astrorhiza limicola.* × 8. (After Brady.)
2. *Astrorhiza limicola.* × 8. Specimen laid open to show the interior. (After Brady.)

Plate 2.

Figs. 1–3. *Astrorhiza arenaria.* × 15. Photographs of three variously shaped specimens.

Plate 3.

Fig. 1. *Astrorhiza arenaria.* × 15. Photograph of broad flattened specimen.
2. *Astrorhiza angulosa.* × 15. Photograph of quadrate specimen.

Plate 4.

Figs. 1–3. *Astrorhiza angulosa.* × 10. Photographs of variously shaped specimens.

Plate 5.

Figs. 1–3. *Astrorhiza vermiformis.* × 15. Photographs of dried specimens showing the characteristic cracks of the exterior.
4. *Astrorhiza granulosa.* ×15. Photograph of typical specimen.

Plate 6.

Fig. 1. *Rhabdammina abyssorum.* × 15. Photograph of quadrate specimen.
2–5. *Rhabdammina cornuta.* × 15. Photographs of irregular short-armed specimens.
6. *Astrorhiza vermiformis.* × 5. Type figure. (After Goës.)

Plate 7.

Fig. 1. *Rhabdammina abyssorum.* × 15. Photograph of four armed specimen.
2–5. *Rhabdammina linearis.* × 15. Photographs of specimens of the somewhat slender irregular form.

PLATE 8.

FIG. 1. *Rhabdammina irregularis.* × 10. (After Brady.)
2, 3. *Marsipella elongata.* × 15. Photographs of two specimens with a large percentage of sponge spicules.
4–6. *Marsipella cylindrica.* × 15. Photographs of specimens with rather more sand grains than usual for this species.

PLATE 9.

(After Heron-Allen and Earland.)

FIG. 1. *Technitella legumen.* Showing external surface of test.
2. *Technitella legumen.* Section of test showing internal surface.
3. *Psammosphaera rustica.* Type-specimen.
4. *Psammosphaera rustica.* Abnormal double specimen.
5. *Psammosphaera bowmanni.* Type-specimen, side view.
6. *Psammosphaera bowmanni.* End view.
7. *Marsipella spiralis.* Type-specimen.
8. *Marsipella cylindrica.* Specimen showing club-shaped end.
9. *Marsipella cylindrica.* A fragment of a specimen, showing a spiral arrangement of the constituent sponge spicules.
All figures × 40.

PLATE 10.

(After Heron-Allen and Earland.)

FIG. 1. *Technitella legumen.* Showing the differential arrangement of the sponge spicules in the external and internal layers. The interstitial cement is represented by the shading. × 140.
2. *Psammosphaera rustica.* × 40.
3. *Psammosphaera rustica.* An abnormal triple specimen. × 40.
4. *Psammosphaera rustica.* Detail showing the method of construction in a "panel" of the test. The central space has been filled in by a fragment of a triaxial sponge spicule. The interstitial cement is represented by dark shading. × 140.
5. *Psammosphaera bowmanni.* × 40.
6. *Marsipella spiralis.* × 40.
7. *Marsipella spiralis.* Detail showing the loosely constructed terminal crown. The constituent spicules are not embedded in cement. × 95.
8. *Marsipella cylindrica.* Specimen showing club-shaped end and elongated spicules. × 40.
9. *Marsipella cylindrica.* Enlarged view of end showing details of construction. 95.

PLATE 11.

FIG. 1. *Rhabdammina discreta.* × 12.
2, 3. *Rhizammina algaeformis.* × 40.
4. *Bathysiphon filiformis.* × 12.
5. *Bathysiphon filiformis.* × 12. The lower portion showing the central cavity and the thickness of the wall.

PLATE 12.

FIG. 1. *Bathysiphon argenteus.* Type-specimen. × 75. (After Heron-Allen and Earland.)
2. *Bathysiphon argenteus.* A portion of the tube. × 200. (After Heron-Allen and Earland.)
3. *Bathysiphon argenteus.* A portion of the tube viewed as a transparent object. × 650. (After Heron-Allen and Earland.)
4–6. *Psammosphaera parva.* × 35. Photographs of specimens each with a single large sponge spicule.
7–10. *Rhizammina indivisa.* Photographs of specimens. × 15.

PLATE 13.

FIGS. 1–5. *Psammosphaera fusca.* Photographs of specimens composed of small black rounded pebbles and light colored cement. × 15.

6. *Psammosphaera fusca.* × 15. Larger specimen attached to *Rhabdammina.*

PLATE 14.

FIGS. 1–3. *Psammosphaera fusca.* × 15. Photographs of specimens composed of fine material attached to *Rhabdammina.*

PLATE 15.

FIGS. 1, 2. *Psammosphaera testacea.* × 15. Photographs of specimens largely composed of tests of *Pulvinulina menardii.*

3. *Psammosphaera testacea.* × 20. Section showing the single layer of tests and the central cavity.

4, 5. *Sorosphaera confusa.* Photographs of irregular specimens. × 20.

6–8. *Storthosphaera albida.* × 15. Photographs of exterior showing the irregular crests characteristic of this species.

PLATE 16.

FIGS. 1, 2. *Storthosphaera albida.* × 20. Exterior views of especially strongly cervicorn specimens. (After Brady.)

3. *Storthosphaera albida.* × 20. Specimen sectioned to show the wall and chamber cavity. (After Brady.)

4. *Saccammina sphaerica.* × 15. Elongate fusiform specimen with two apertures. (After Brady.)

5. *Saccammina sphaerica.* × 15. Side view of specimen. (After Brady.)

6. *Technitella melo.* × 50. *a*, side view; *b*, apertural view. (After Brady.)

7. *Technitella legumen.* × 50. Side view. (After Brady.)

8. *Technitella legumen.* × 30. Side view of larger more regular specimen. (After Brady.)

PLATE 17.

FIG. 1. *Rhaphidoscene conica.* Specimen attached to *Botellina.* Copy of type figure. *a*, *b*, front and side views. (After Vaughan-Jennings.)

PLATE 18.

FIG. 1. *Storthosphaera elongata.* × 15. Photograph of exterior of specimen.

2. *Storthosphaera elongata.* × 15. Sectioned specimen showing thick matted wall and central chamber cavity.

PLATE 19.

FIG. 1. *Storthosphaera elongata.* × 15. Photograph of shorter specimen.

2–5. *Saccammina sphaerica.* × 15. Photographs of spherical specimens with large circular apertures referred to this species.

6, 7. *Proteonina micacea.* Photographs of specimens composed of mica scales.

8. *Lagenammina laguncula.* × 25. Figures of specimens. (After Rhumbler.)

PLATE 20.

FIGS. 1–4. *Proteonina testacea.* × 15. Photographs of specimens composed of tests of *Pulvinulina* and *Globigerina* with abundant cement.

5. *Saccammina minuta.* × 25. Figure after Rhumbler.

6. *Proteonina helenae.* × 75. Specimen composed of fragments of tests of *Globigerina* and other foraminifera. (After Rhumbler.)

7. *Proteonina helenae.* × 75. Specimen by transmitted light composed largely of entire tests of other foraminifera. (After Rhumbler.)

PLATE 21.

FIG. 1. *Proteonina difflugiformis.* × 50. Specimen composed of large fragments of other foraminiferal tests. (After Rhumbler.)

2. *Proteonina difflugiformis.* × 50. Specimen composed of fine fragments. (After Rhumbler.)

3. *Pelosina parva.* × 75. (After Rhumbler.)

4. *Pelosina rotundata.* × 20. Small specimen with elongate neck. (After Brady.)

5. *Pelosina rotundata.* × 20. Larger specimen. (After Brady.)

6. *Pelosina rotundata.* × 20. Sectional specimen showing thick wall and comparatively small central cavity. (After Brady.)

PLATE 22.

FIGS. 1–4. *Pelosina variabilis.* × 15. Photographs of irregular elongate specimens.

5. *Pelosina cylindrica.* × 15.

PLATE 23.

FIG. 1. *Pelosina arborescens.* × 2. Figure of entire specimen with its branching arms. (After Pearcey.)

2. *Pelosina arborescens.* × 4. *a*, side view; *b*, sectional view. (After Pearcey.)

3, 4. *Hippocrepina indivisa.* × 45. Side views. (After Brady.)

5. *Hippocrepina indivisa.* × 45. Longitudinal section showing undivided cavity and comparatively thin wall. (After Brady.)

6, 7. *Hippocrepina indivisa.* × 45. Apertural views showing the raised lip. (After Brady.)

PLATE 24.

FIGS. 1, 2. *Technitella thompsoni.* × 75. Side views showing the test composed of echinoderm plates. (After Heron-Allen and Earland.)

3–5. *Technitella legumen.* × 15. Photographs of exterior.

PLATE 25.

FIGS. 1–3. *Webbinella hemisphaerica.* × 15. Photographs of specimens attached to black pebbles.

4. *Crithionina pisum.* × 15. Section showing thickness of wall and central cavity.

5. *Crithionina pisum.* × 15. Photograph of exterior.

6. *Tholosina bulla.* × 15. Photograph of specimen attached to *Rhabdammina*.

PLATE 26.

FIGS. 1, 2. *Crithionina pisum.* × 15. Photographs of exterior.

3. *Crithionina pisum.* × 15. Photograph showing thickness of wall and central cavity.

4. *Crithionina pisum*, var. *hispida.* × 15. Photograph of exterior.

5. *Technitella legumen.* Showing the central cavity and wall with the interior spicules arranged horizontally, the outside ones vertically. × 15. (After Goës.)

6, 7. *Crithionina granum.* × 12. Exterior of two specimens. (After Goës.)

PLATE 27.

FIG. 1. *Crithionina mamilla.* × 15. Photograph of exterior.

2. *Crithionina mamilla.* × 15. Photograph of sectional specimen showing comparatively small central cavity and radiating tubules.

PLATE 28.

FIG. 1. *Thurammina cariosa.* × 15. Photograph of exterior

2. *Thurammina favosa.* × 15. Photograph showing wall, central cavity, and apertures.

3. *Thurammina favosa.* × 15. Photograph of exterior.

4-8. *Thurammina albicans.* × 50. (After Brady.) Fig. 5, section showing thickness of wall and size of central cavity.

9. *Thurammina compressa.* × 50. (After Brady.) *a*, from above; *b*, from side.

10. *Thurammina papillata.* × 50. (After Brady). Three chambers adhering.

11. *Thurammina papillata.* × 30. Exterior view. (After Brady.)

12. *Crithionina mamilla.* × 15. Photograph of exterior.

PLATE 29.

FIGS. 1-3. *Hyperammina friabilis.* × 15. Photographs of exterior. Fig. 2 showing thickness of wall and part of cavity.

4. *Hyperammina elongata.* × 15. Photograph of exterior.

5, 6. *Hyperammina laevigata.* × 15. Photograph of exterior.

7, 8. *Hyperammina subnodosa.* × 15. Photograph of exterior.

PLATE 30.

FIG. 1. *Psammatodendron arborescens.* × 20. (After Brady.)

2. *Psammatodendron arborescens.* × 100. Terminal branch with aperture. (After Brady.)

3. *Saccorhiza ramosa.* × 15. Photograph of specimen with proloculum.

4. *Saccorhiza ramosa.* × 15. Photograph of irregular branching portion.

PLATE 31.

FIG. 1. *Syringammina fragilissima.* Natural size. *a*, side view of a fragment representing about half an entire specimen; *aa*, original surface of specimen; *b*, ventral view of same specimen, showing uneven fractured surface near the middle of the test; dotted line shows approximately the original outline of the test. (After Brady.)

2. *Syringammina fragilissima.* × 8. Portion of a radial section, showing at *c* one of the smaller secondary canals, and at *cc* one of the concentric reticulated partitions. (After Brady.)

3. *Dendrophrya radiata.* × 45. Exterior of specimen. (After Brady.)

PLATE 32.

FIGS. 1, 2. *Jaculella acuta.* × 12. Exterior. (After Brady.)

3, 4. *Jaculella acuta.* × 15. Photographs of exterior.

5. *Jaculella obtusa.* × 12. Exterior. (After Brady.)

6, 7. *Dendrophrya radiata.* × 40. (After Brady.)

PLATE 33.

FIG. 1. *Haliphysema tumanowiczii.* × 50. Single specimen. (After Brady.)

2. *Haliphysema tumanowiczii.* × 20. Group of attached specimens. (After Brady.)

3. *Dendrophrya erecta.* × 30. Two specimens. (After Brady.)

4. *Dendrophrya erecta.* × 25. Single, much branched specimen. (After Brady.)

PLATE 34.

FIG. 1. *Haliphysema ramulosum.* × 20. (After Brady.)

2. *Ammolagena clavata.* × 60. Specimen broken away showing the thin lower surface. (After Brady.)

3. *Ammolagena clavata.* × 15. Photograph of microspheric specimen with narrow elongate proloculum.
4. *Ammolagena clavata.* × 15. Photograph of megalospheric specimen with nearly circular proloculum.
5. *Ammolagena clavata.* × 15. Photograph of broken specimen showing thin wall of proloculum attached to shell.

PLATE 35.

FIGS. 1-3. *Ammolagena clavata.* × 30. Photographs of specimens attached to shell fragments.
4, 5. *Girvanella vagans.* × 20. Photographs of specimens attached to tubes of *Rhabdammina.*

PLATE 36.

FIG. 1. *Girvanella vagans.* × 15. Photograph of specimen with proloculum.
2. *Girvanella schaudinni.* × 15.
3. *Amodiscoides turbinatus.* × 15. Photograph, dorsal view.
4. *Ammodiscoides turbinatus.* × 15. Side view.
5. *Ammodiscoides turbinatus.* × 15. Dorsal view of small specimen.
6. *Ammodiscoides turbinatus.* × 15. Ventral view.
7-9. *Glomospira gordialis.* × 70. (After Brady.)
10. *Glomospira charoides.* × 70. Broken specimen showing several coils. (After Brady.)
11. *Glomospira charoides.* × 70. Longitudinal section of test. (After Brady.)
12-15. *Glomospira charoides.* × 70. (After Brady.)

PLATE 37.

Ammodiscoides turbinatus.

FIG. 1. Complete specimen. × 20.
2. Younger specimen. × 45.
3. Apertural view of a still younger specimen showing the conical young. × 60.
4. The young portion of the test without the later coils. × 75.
5, 6. Diagrammatic sections showing the reversing of the conical form in the late coils × 45. × 60.

PLATE 38.

FIG. 1. *Turritellella spectabilis.* × 15. Photograph of specimen in United States National Museum received from Doctor Carpenter.
2, 3. *Turritellella spectabilis.* × 12. External view. (After Brady.)
4. *Turritellella spectabilis.* × 12. Sectioned specimen. (After Brady.)
5-7. *Turritellella shoneana.* × 100. *a, a,* side view; *b, b,* apertural views. (After Brady.)

PLATE 39.

Ammodiscus incertus.

FIGS. 1-4. Microspheric specimens, the centers consisting of a microspheric proloculum and numerous fine coils. × 15.
5-7. Megalospheric specimens, the centers consisting of a megalospheric proloculum and a few broad coils. × 15.
8. Sectioned specimen, microspheric form. × 15. (After Brady.)

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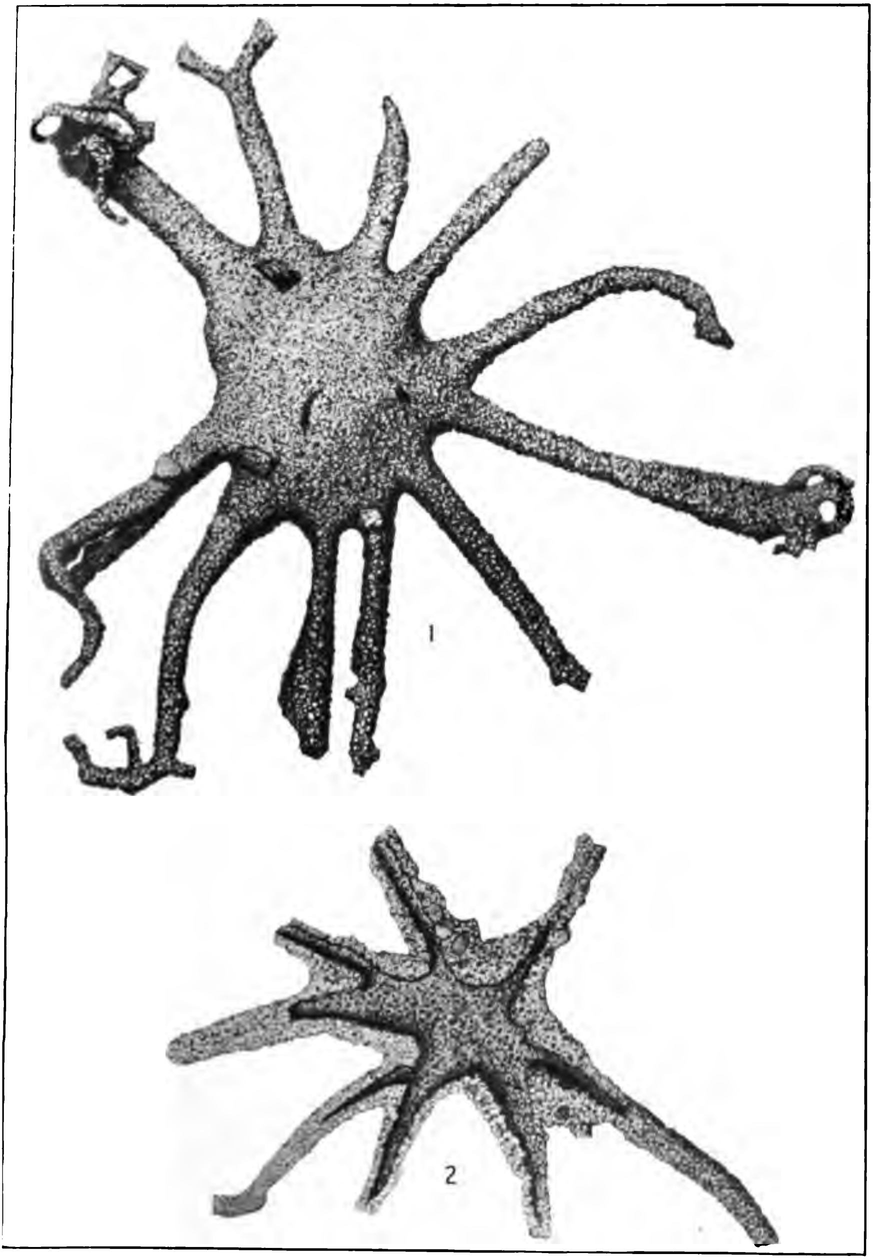

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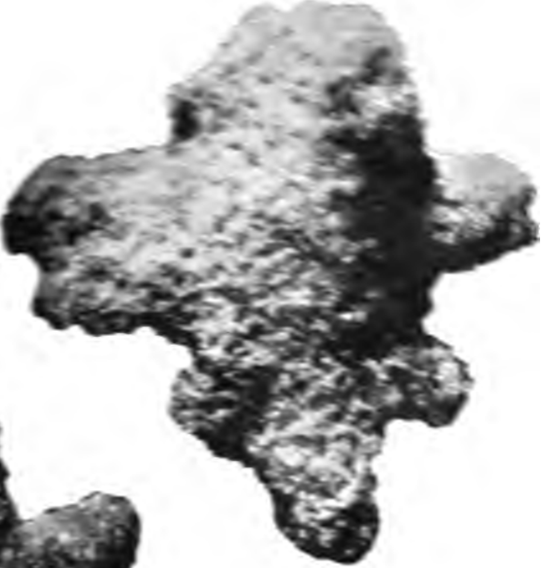

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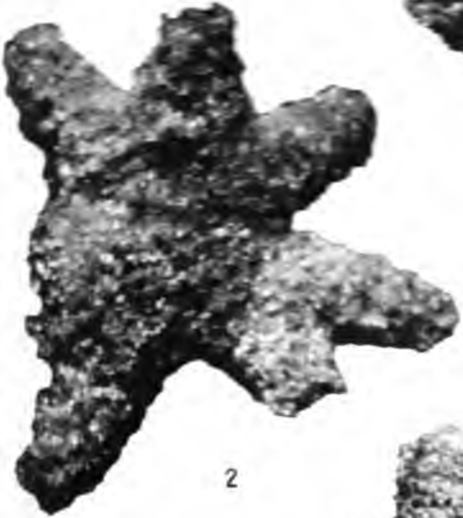

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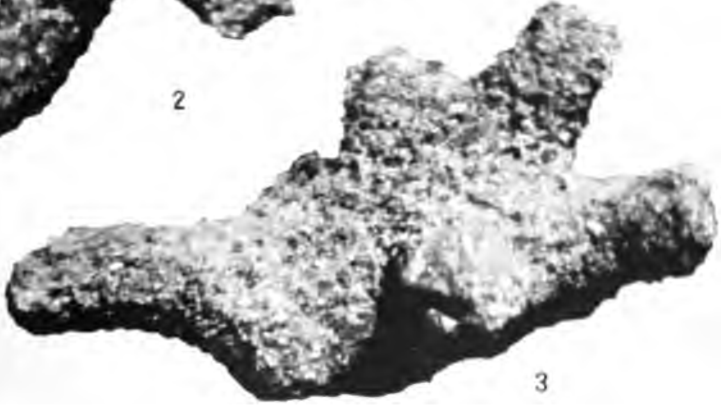

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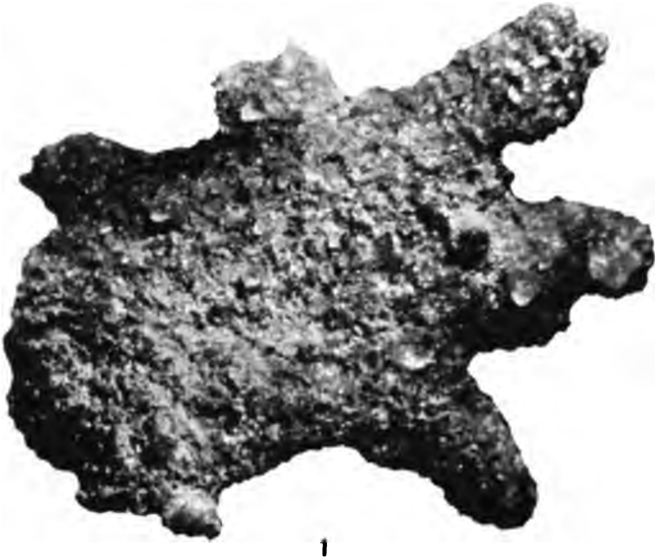

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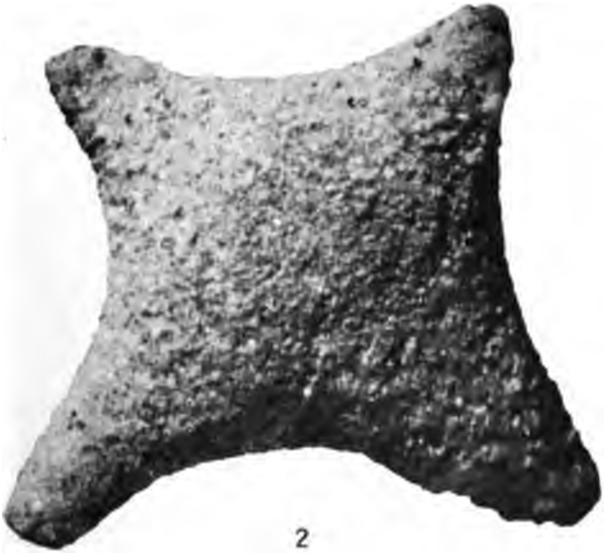

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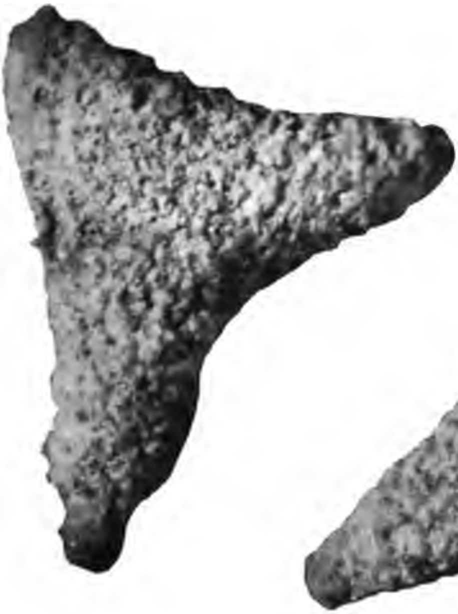

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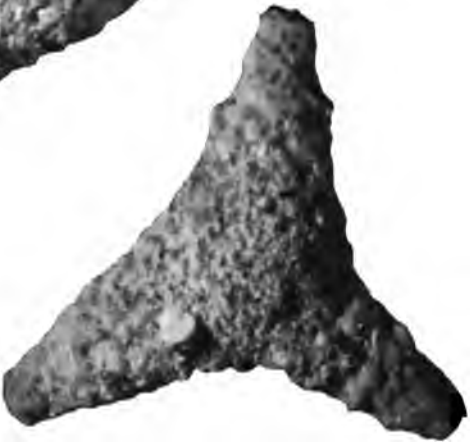

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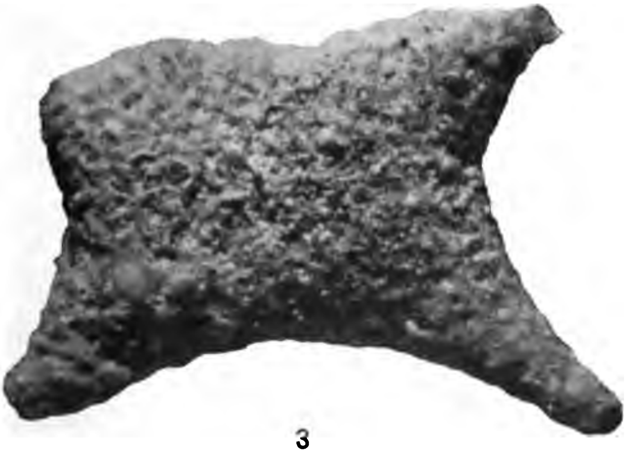

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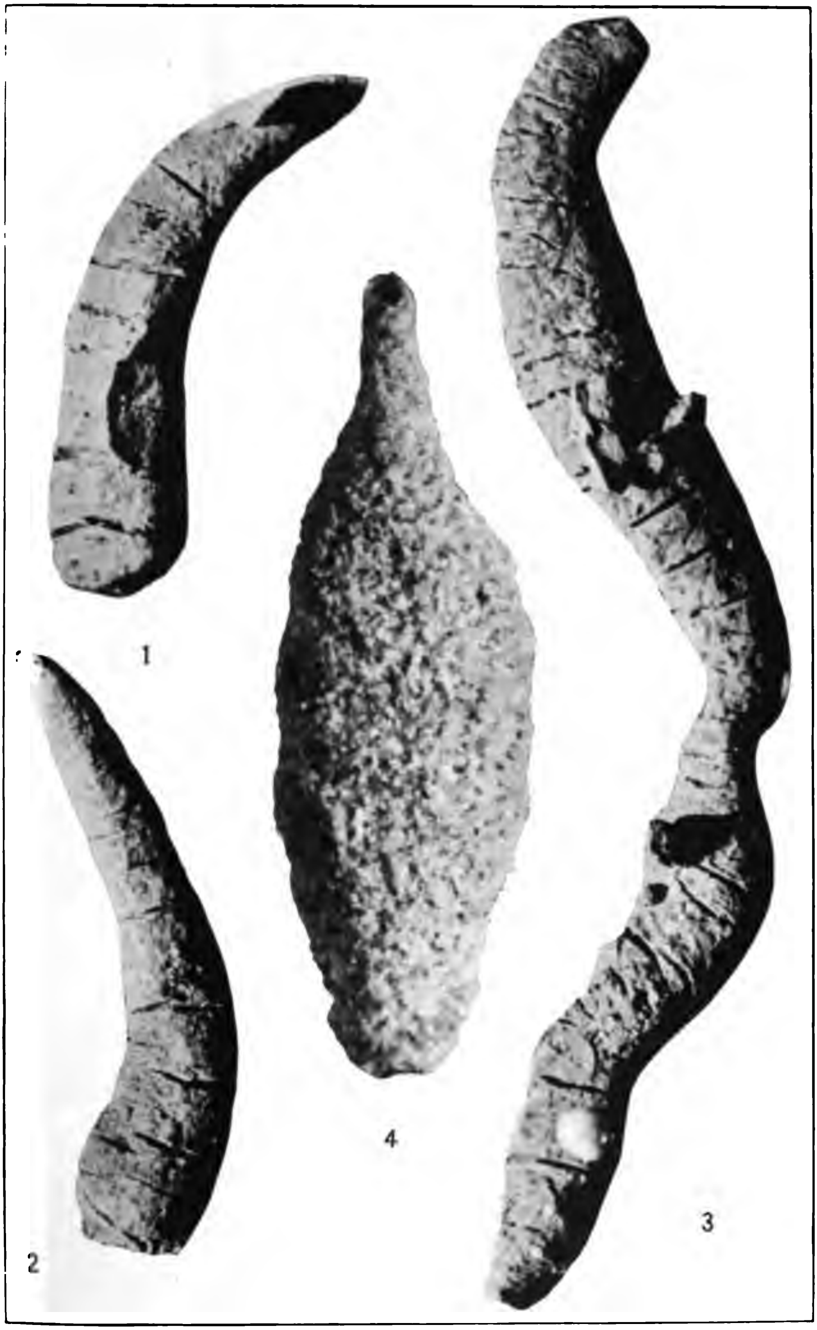

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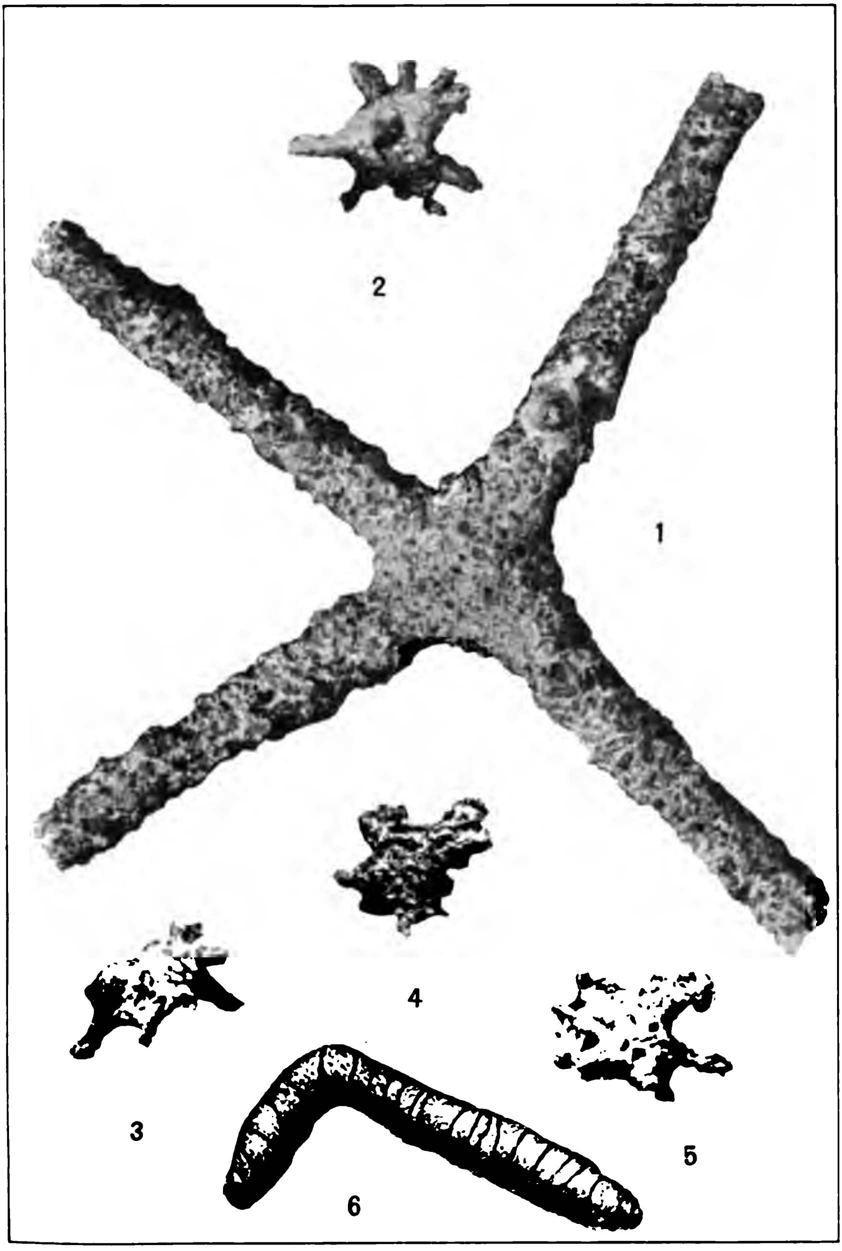

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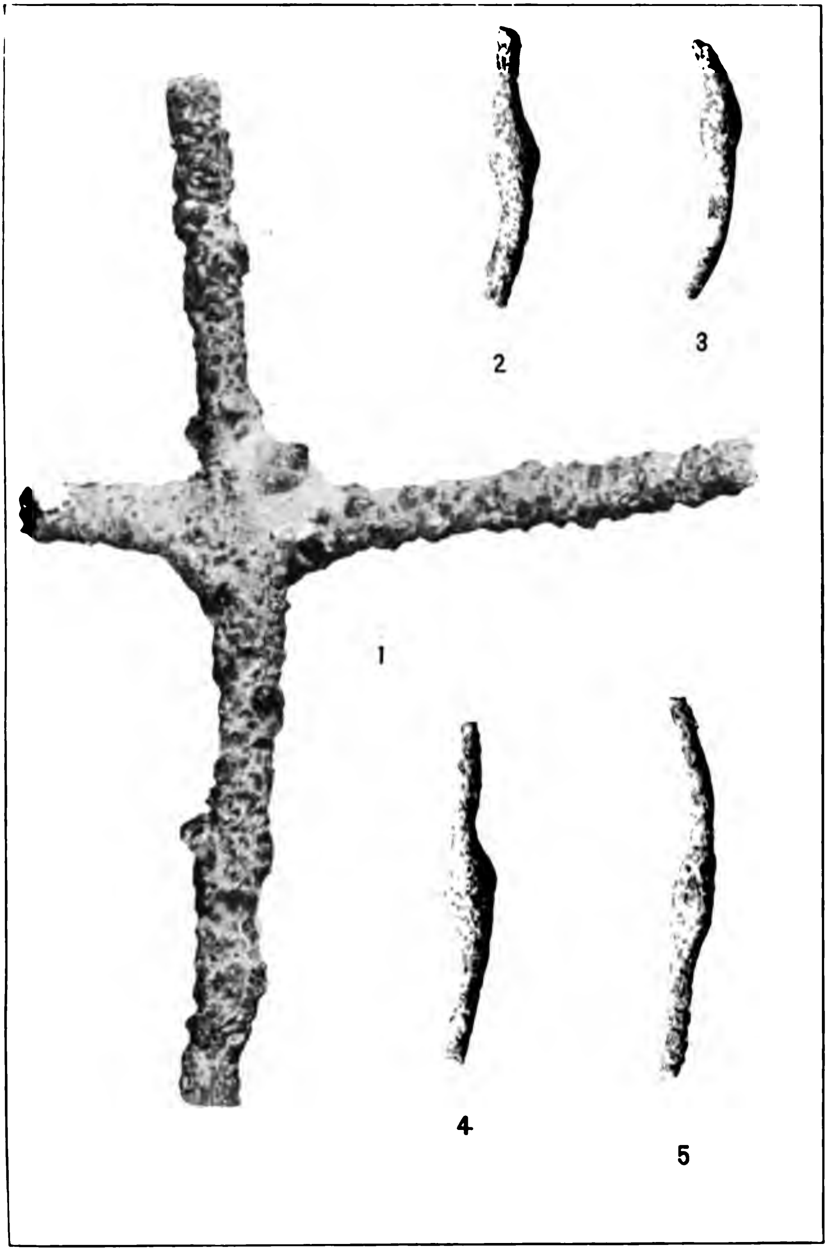

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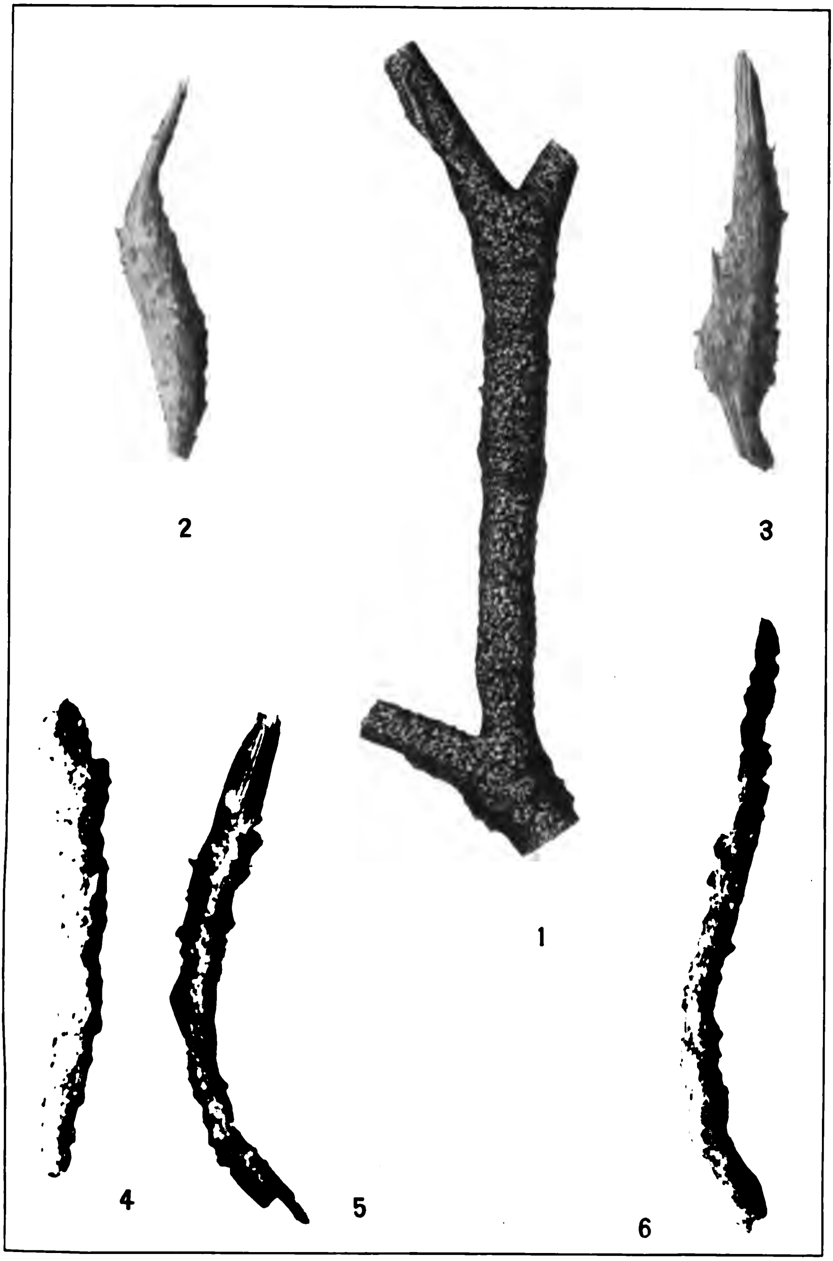

Astrorhizidae of the Atlantic Ocean.

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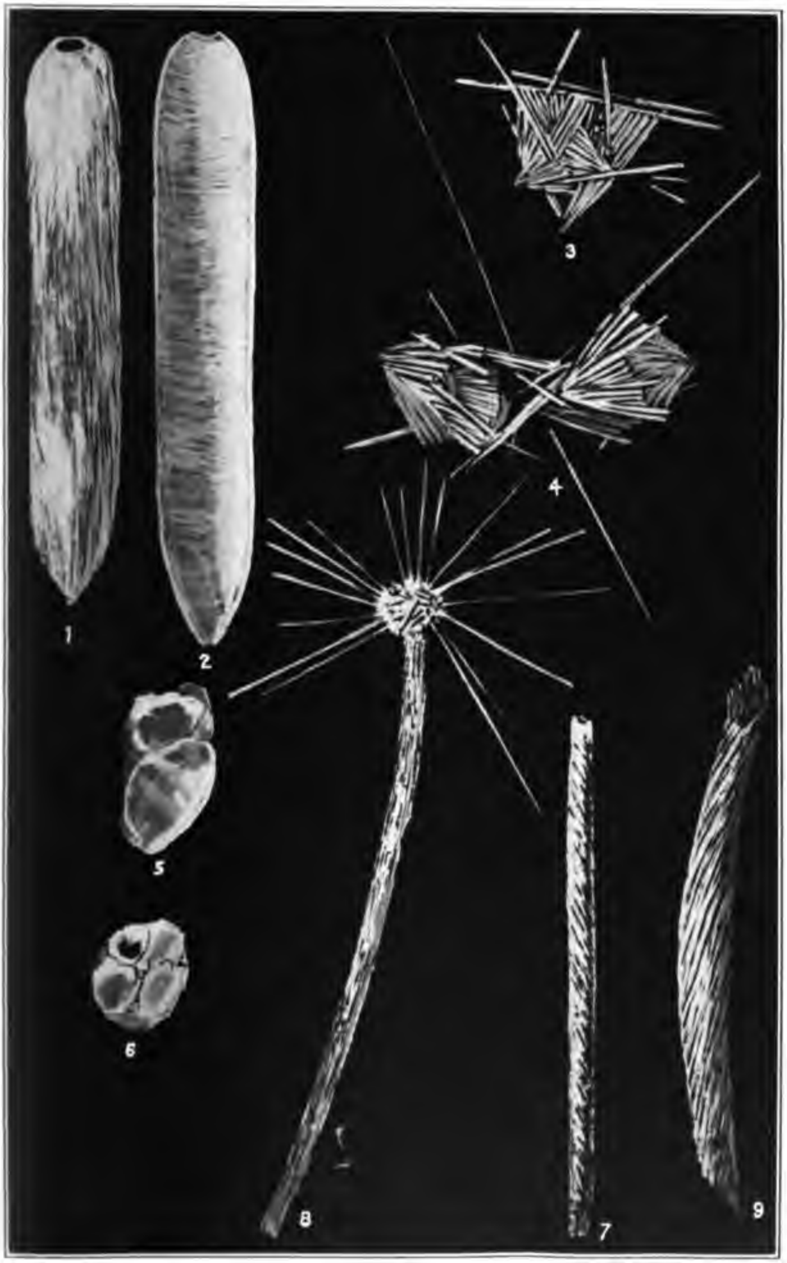

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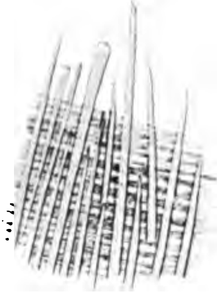

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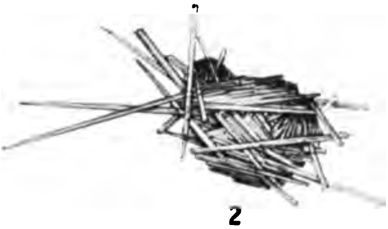

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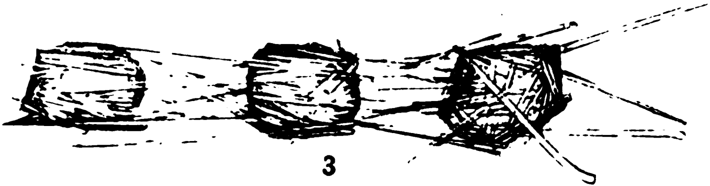

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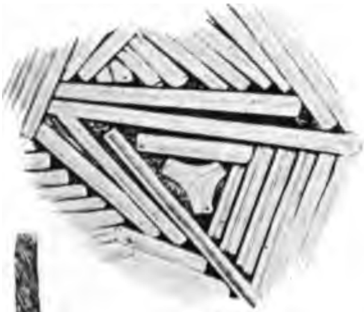

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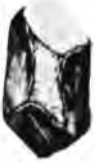

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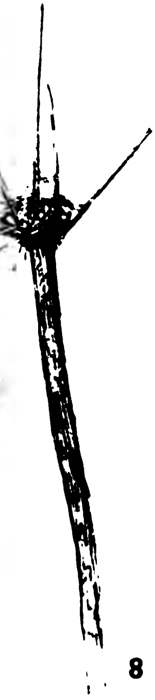

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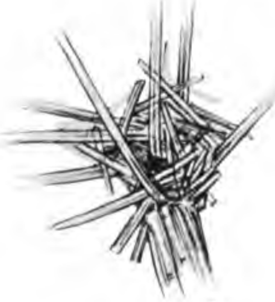

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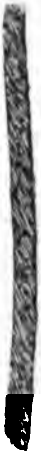

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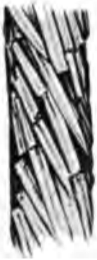

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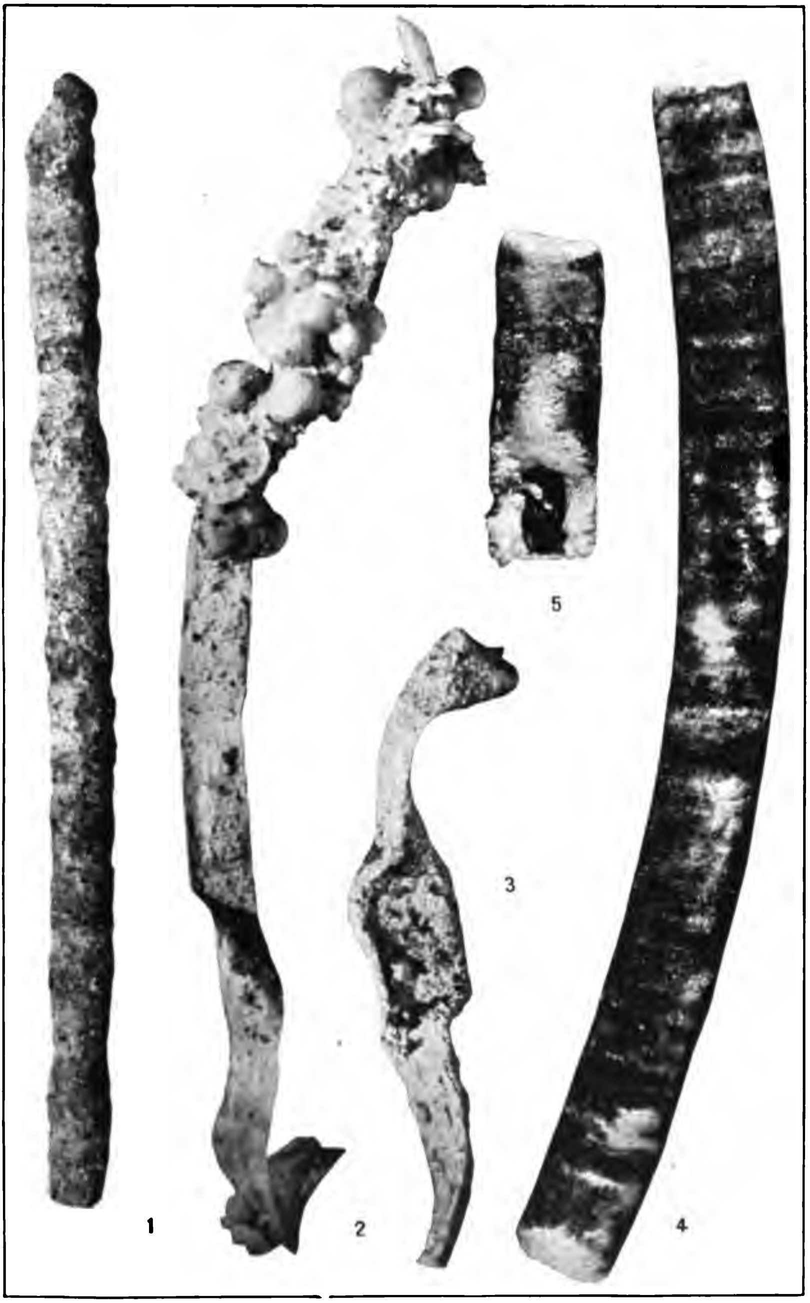

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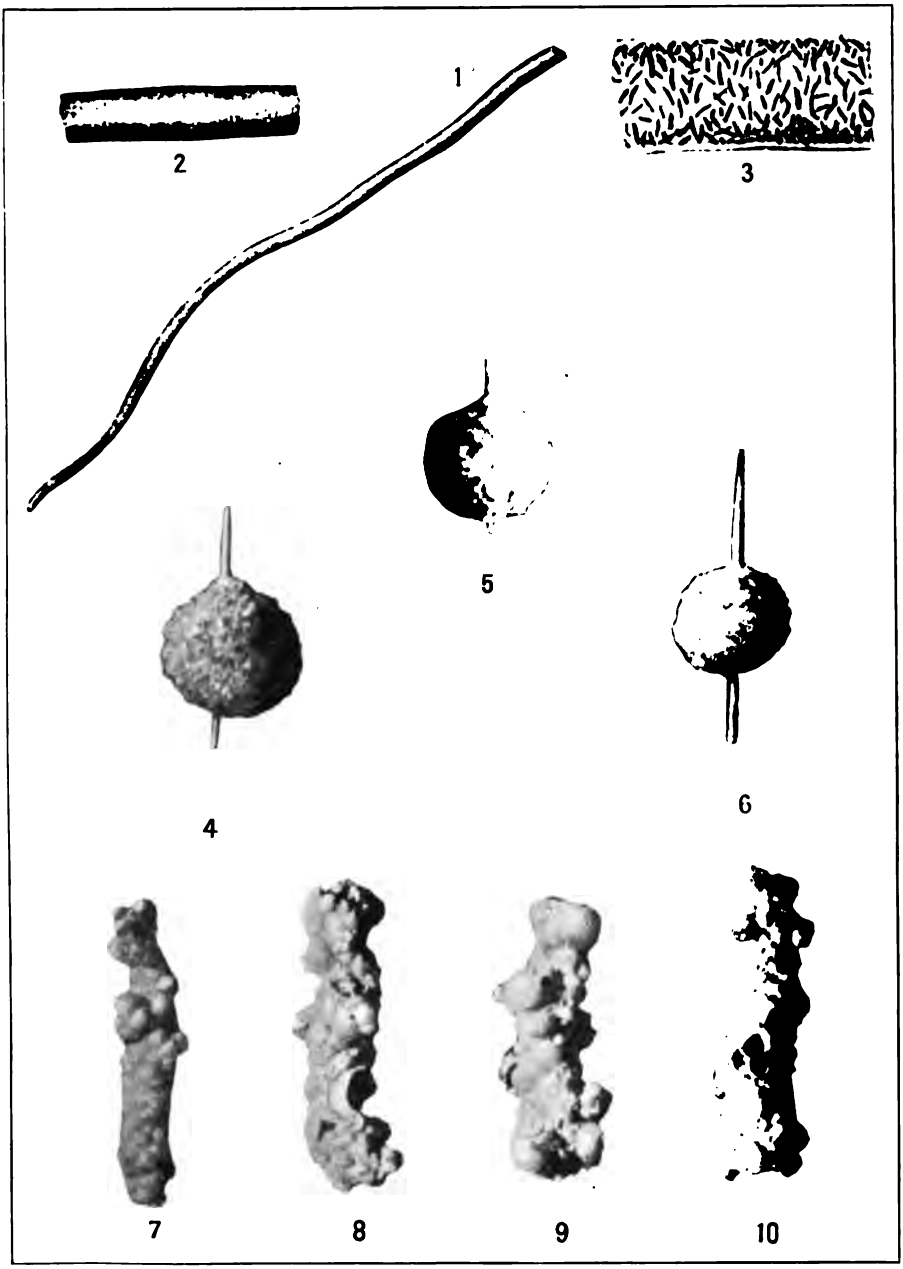

Astrorhizidae of the Atlantic Ocean.

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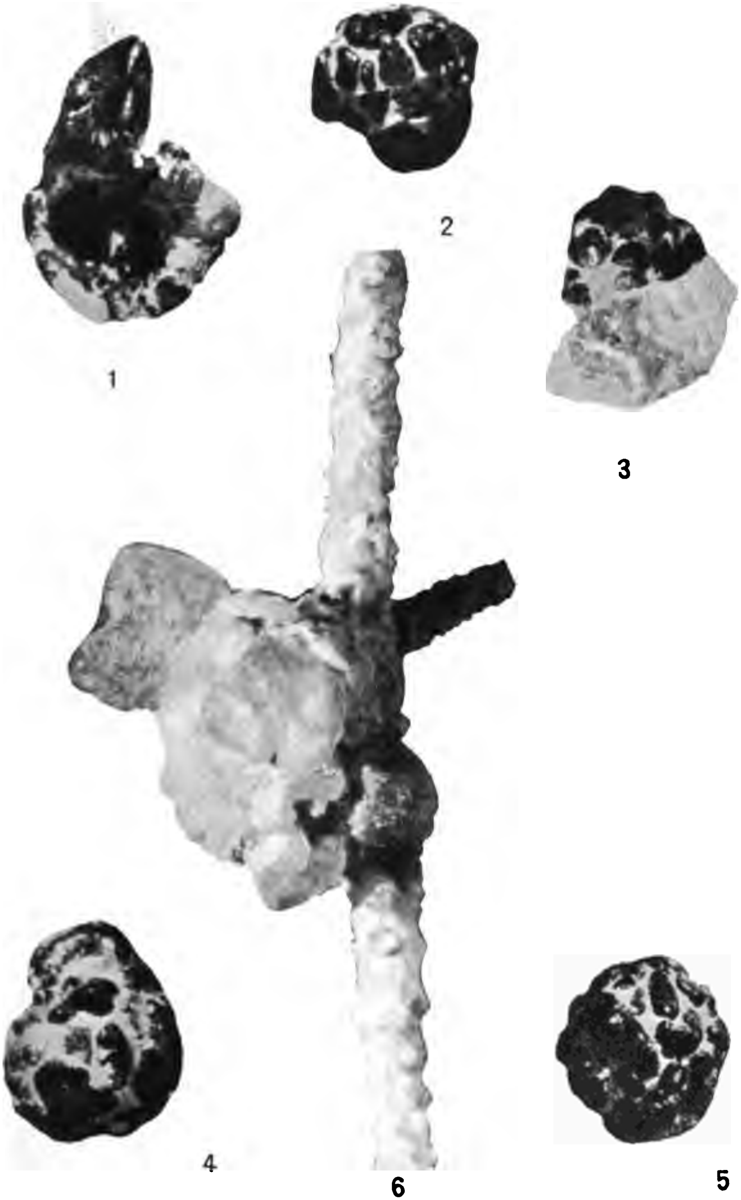

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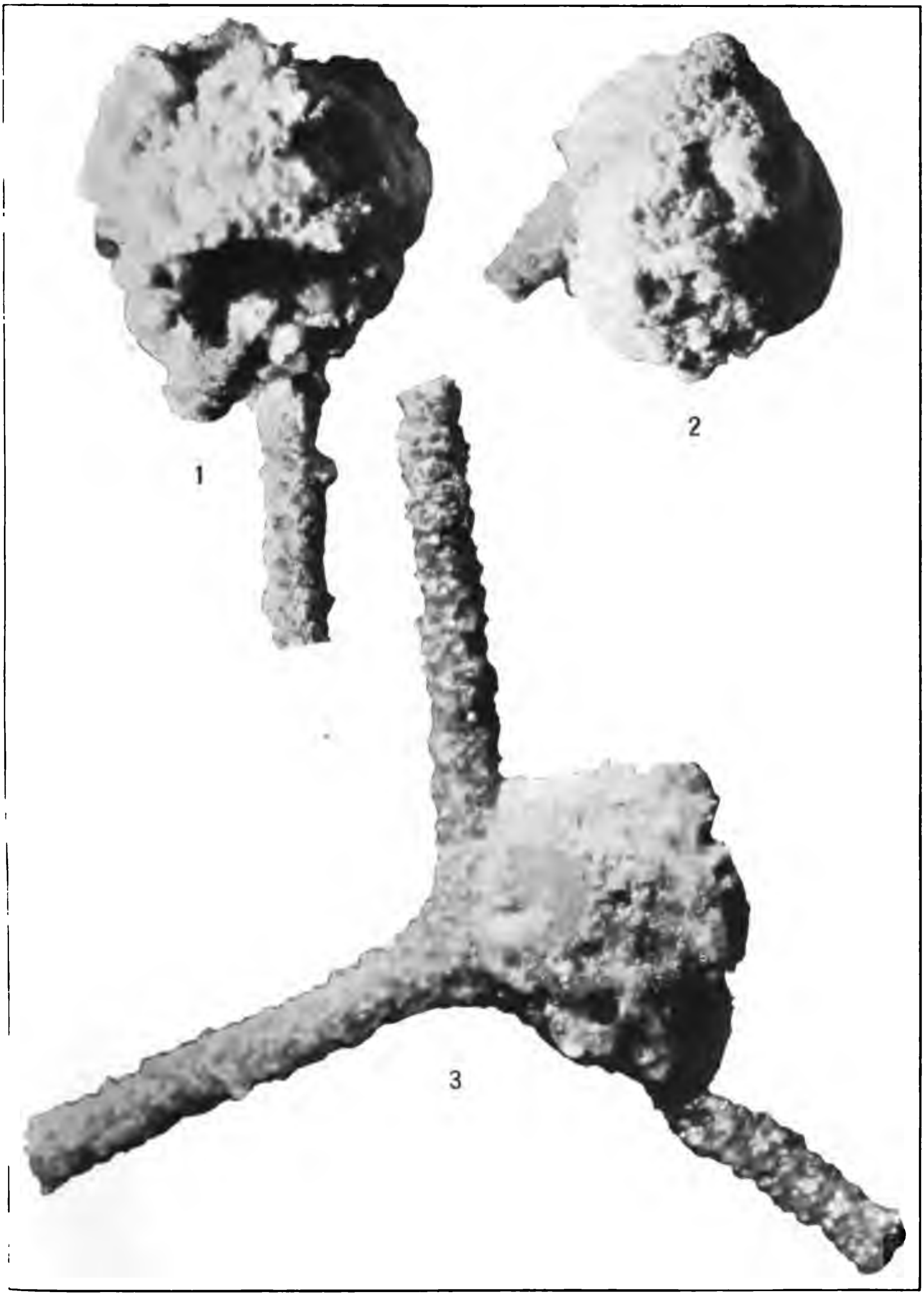

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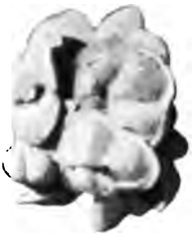

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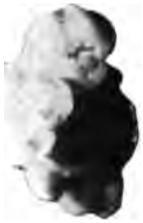

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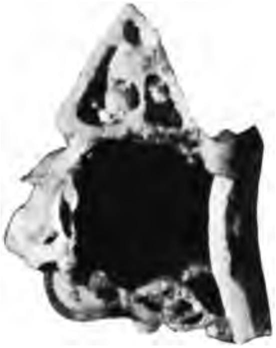

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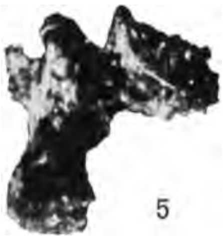

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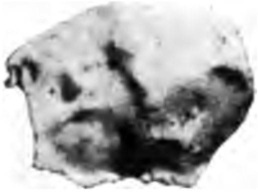

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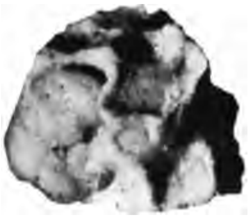

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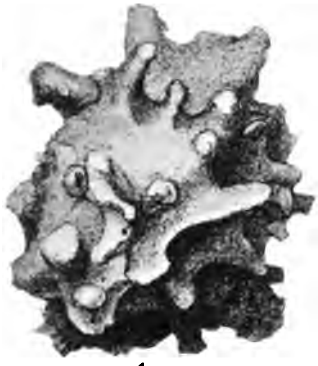

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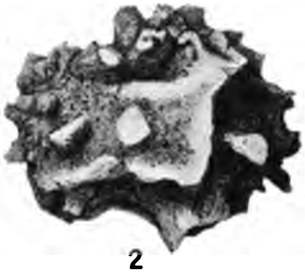

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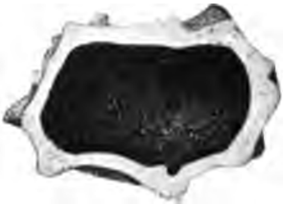

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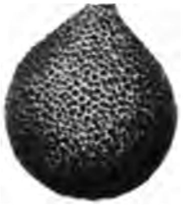

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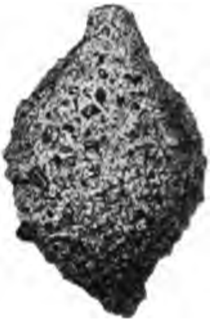

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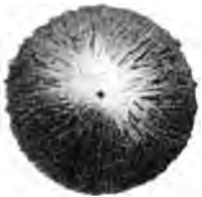

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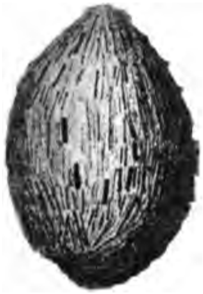

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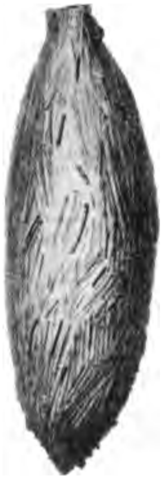

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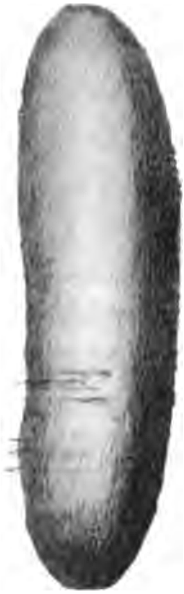

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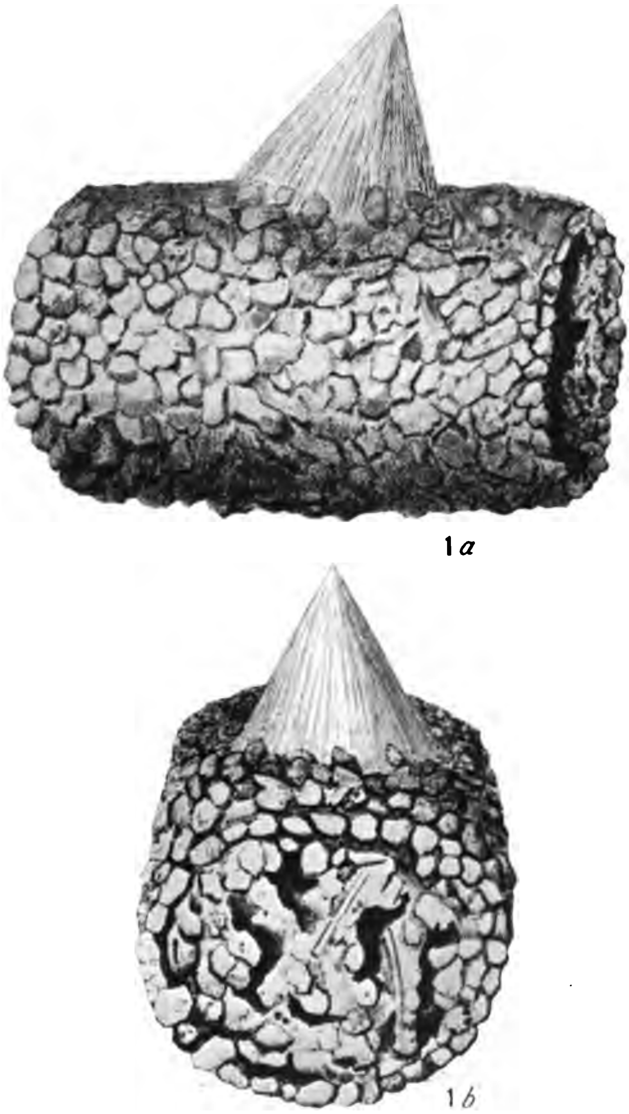

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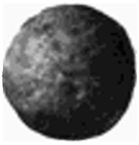

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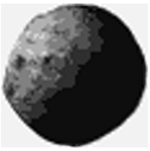

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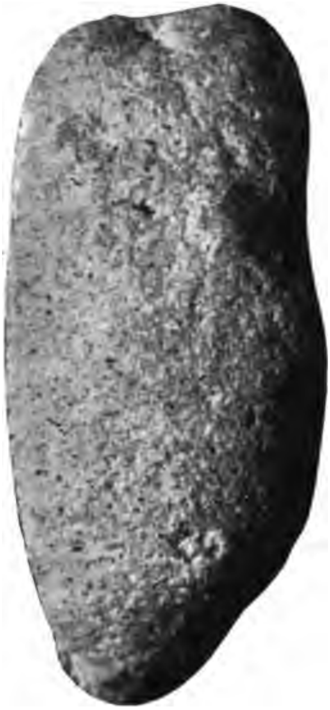

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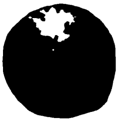

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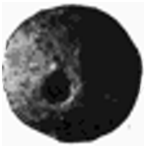

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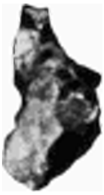

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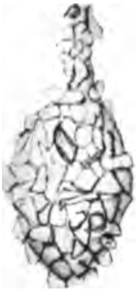

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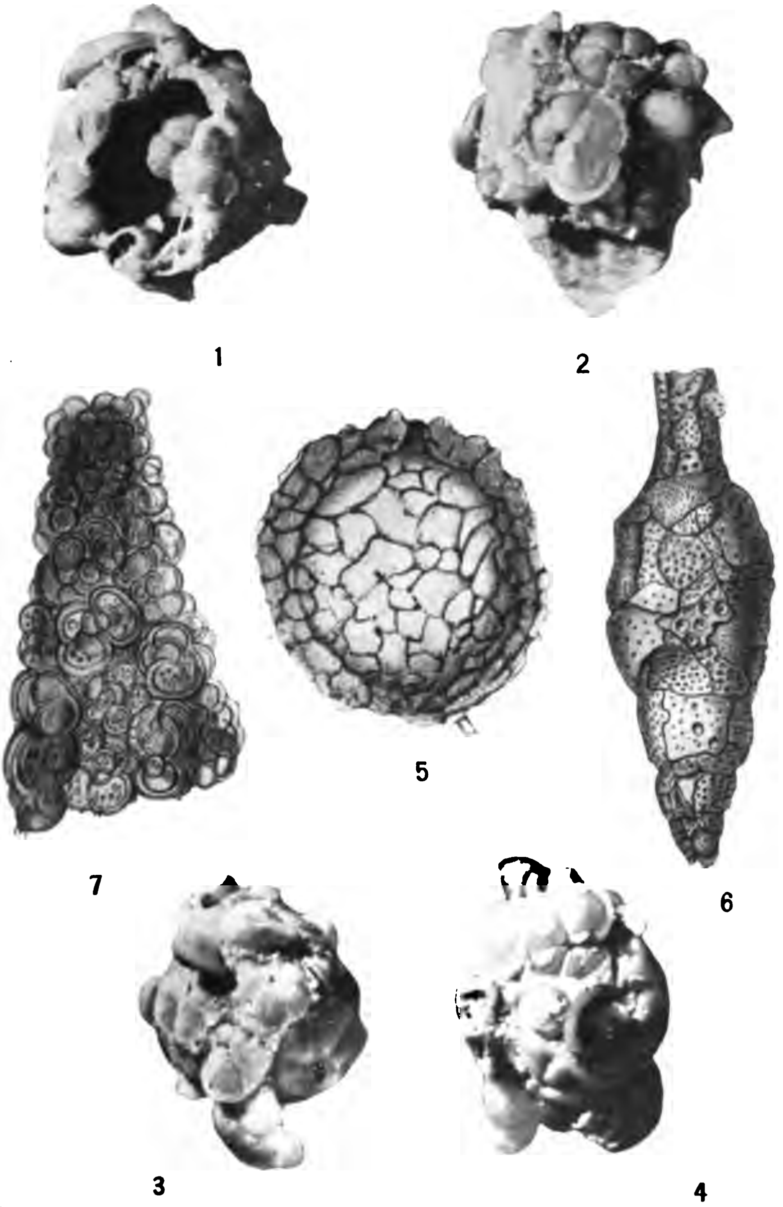

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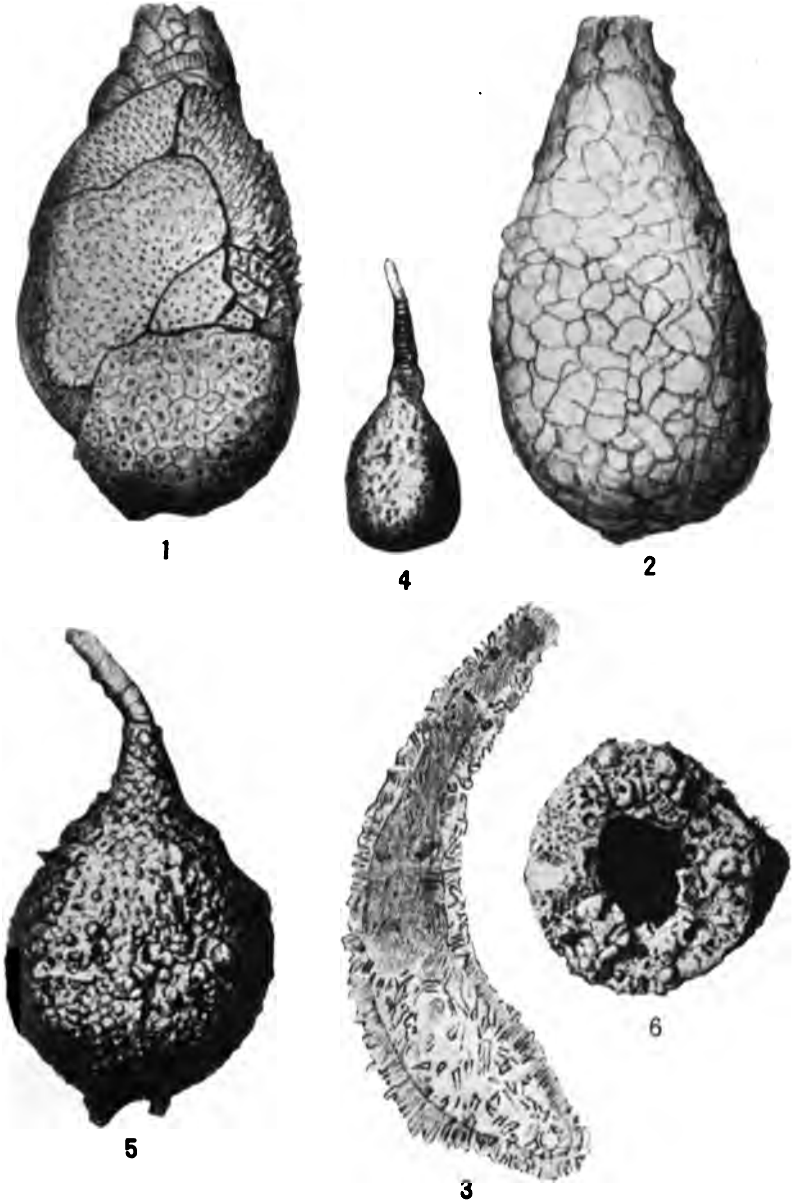

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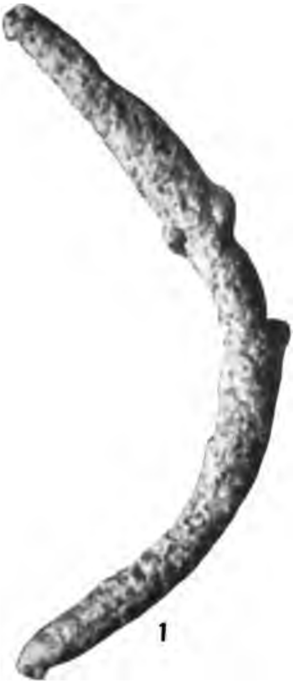

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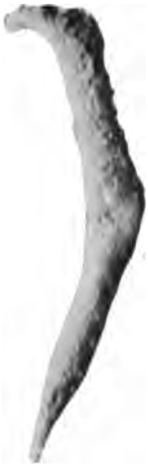

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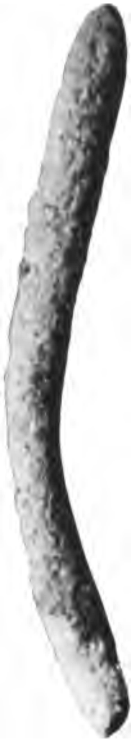

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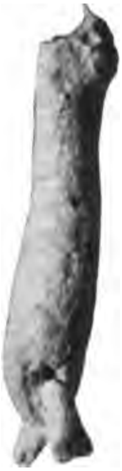

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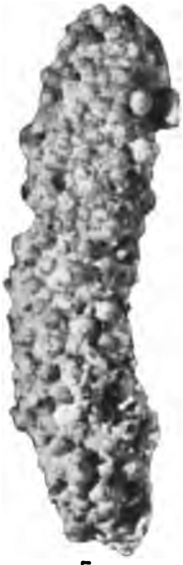

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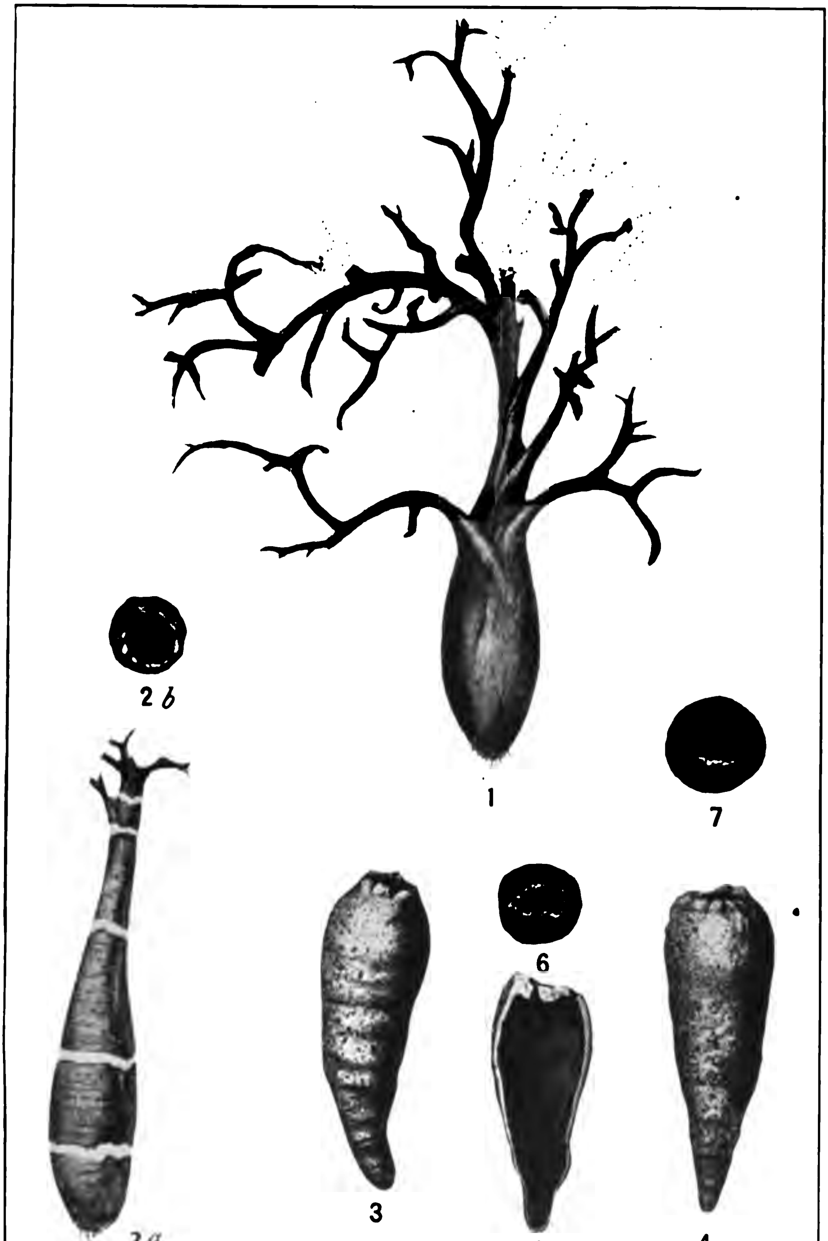

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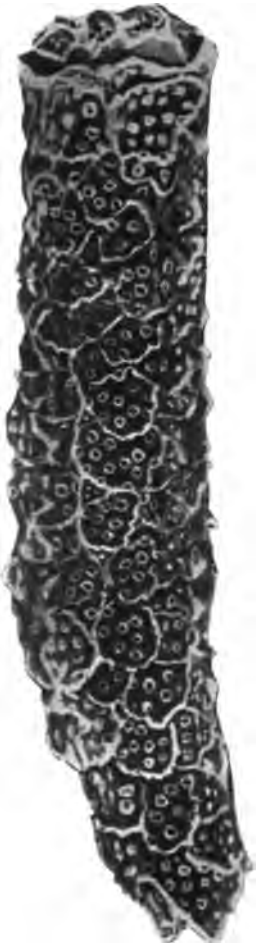

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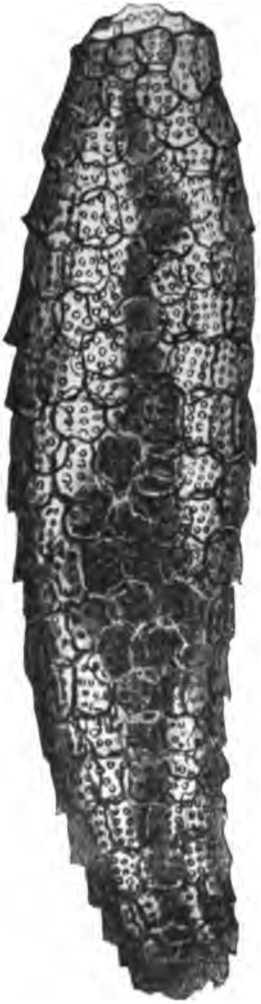

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ASTRORHIZIDAE OF THE ATLANTIC OCEAN.

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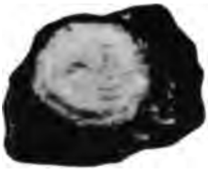

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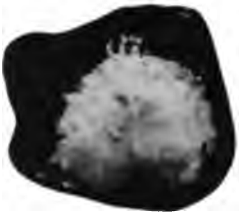

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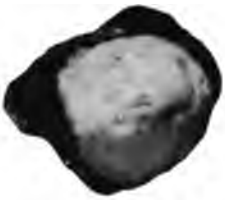

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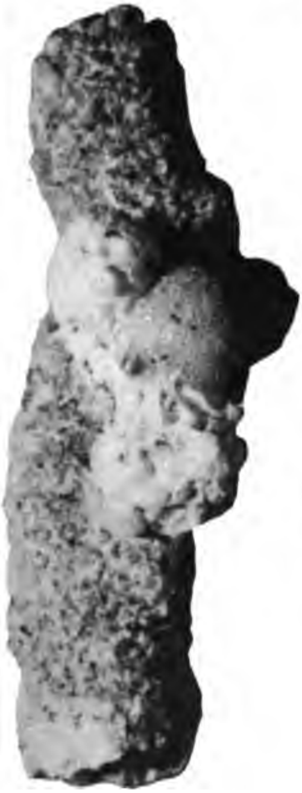

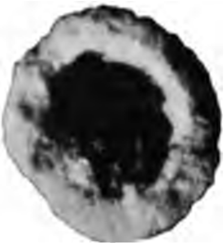

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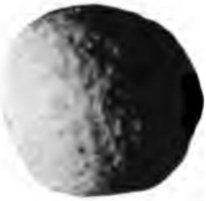

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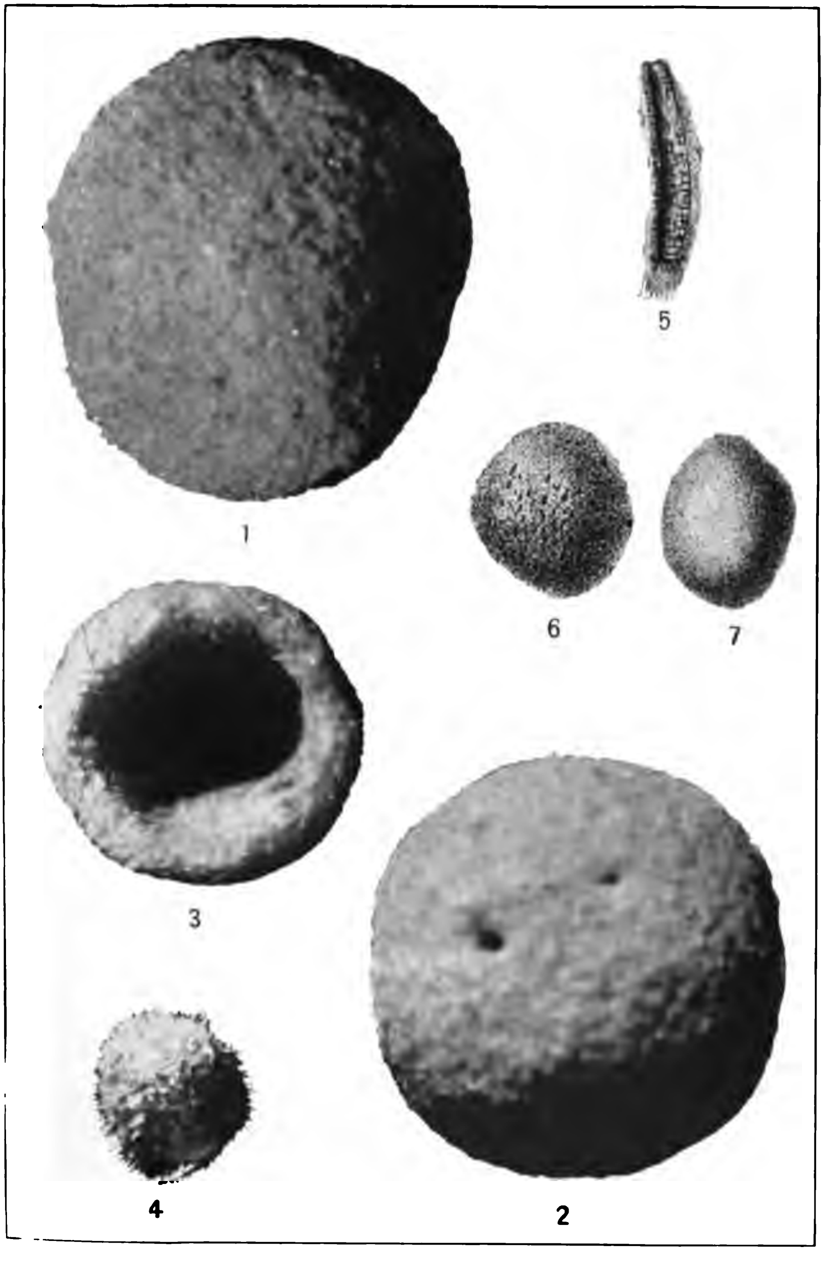
ASTRORHIZIDAE OF THE ATLANTIC OCEAN.

FOR EXPLANATION OF PLATE SEE PAGE 106.

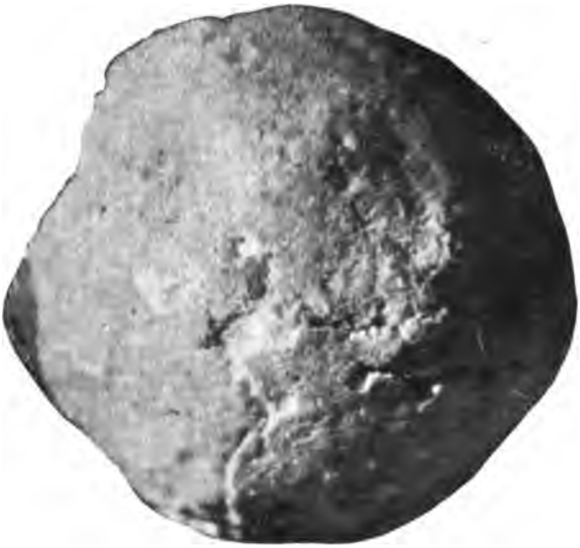
UNIV. OF MICH.



ASTRORHIZIDAE OF THE ATLANTIC OCEAN.

FOR EXPLANATION OF PLATE SEE PAGE 106.

UNIV. OF MICH.



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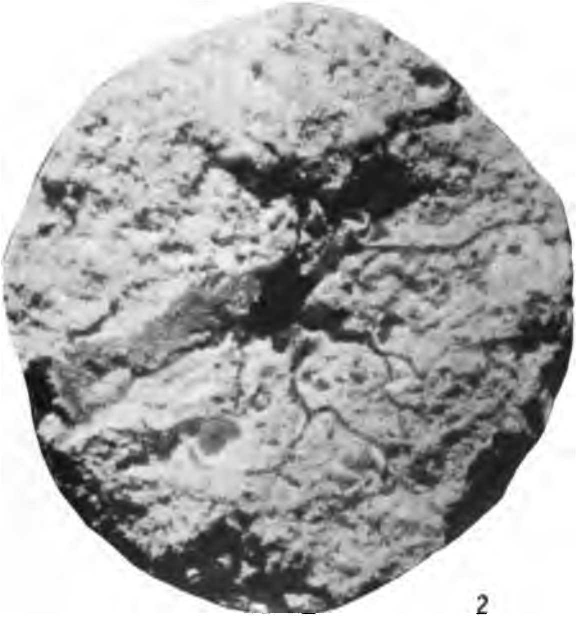

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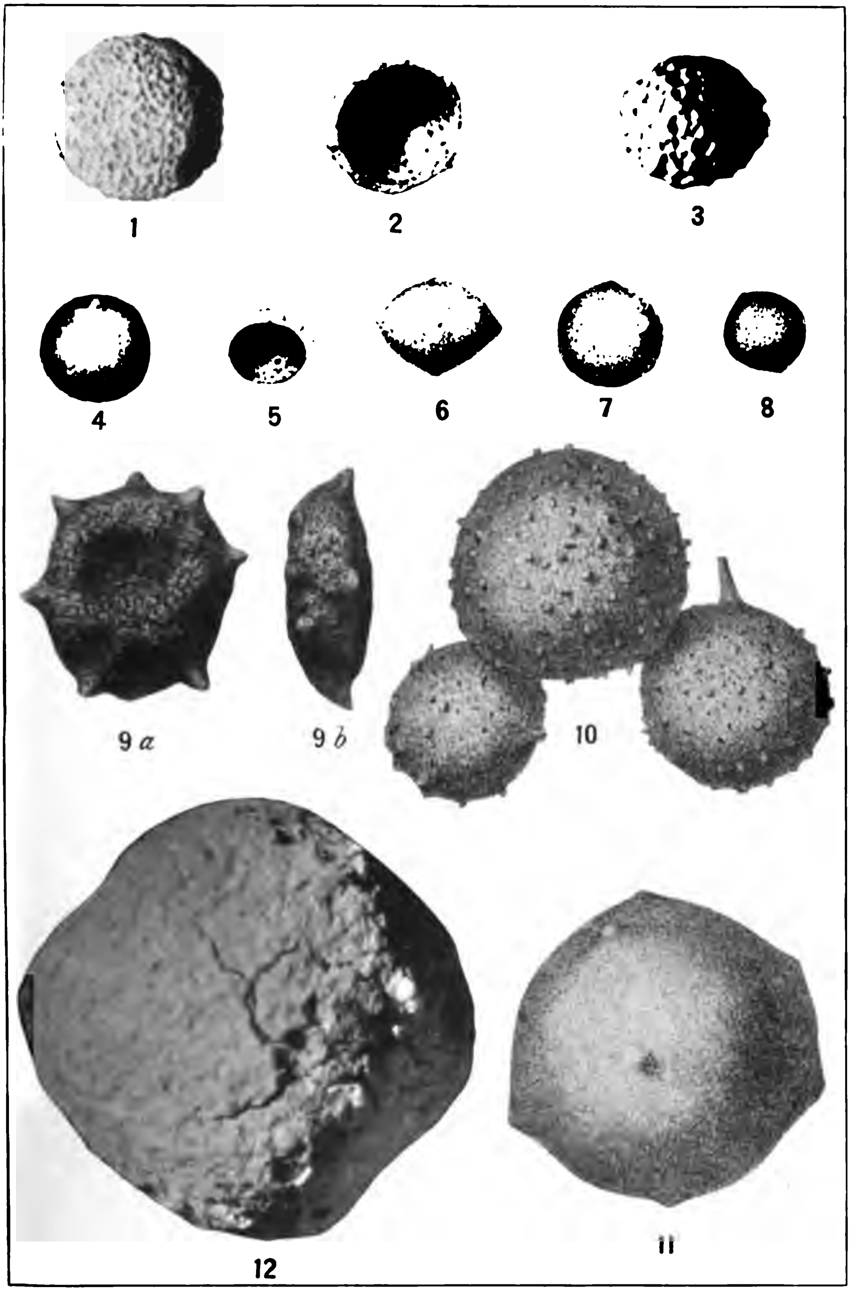
ASTRORHIZIDAE OF THE ATLANTIC OCEAN.

FOR EXPLANATION OF PLATE SEE PAGE 106.

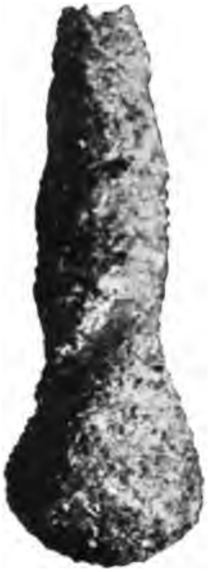
UNIV. OF MICH.



ASTRORHIZIDAE OF THE ATLANTIC OCEAN.

FOR EXPLANATION OF PLATE SEE PAGE 107.

UNIV. C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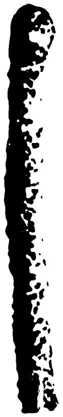
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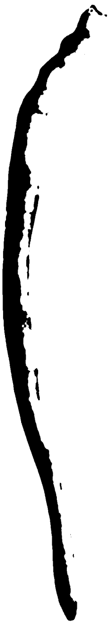
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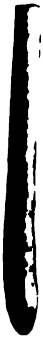
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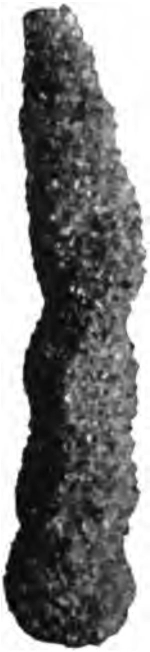
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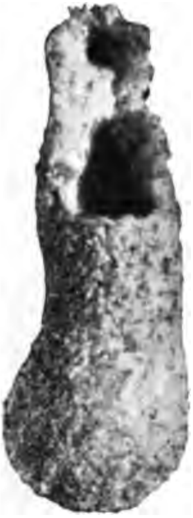
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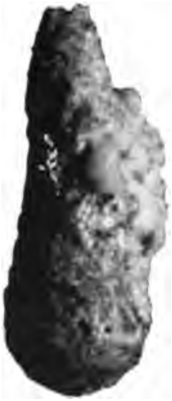
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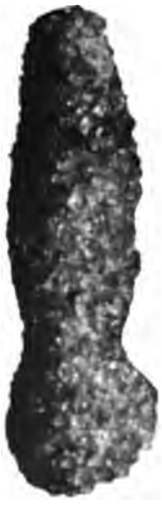
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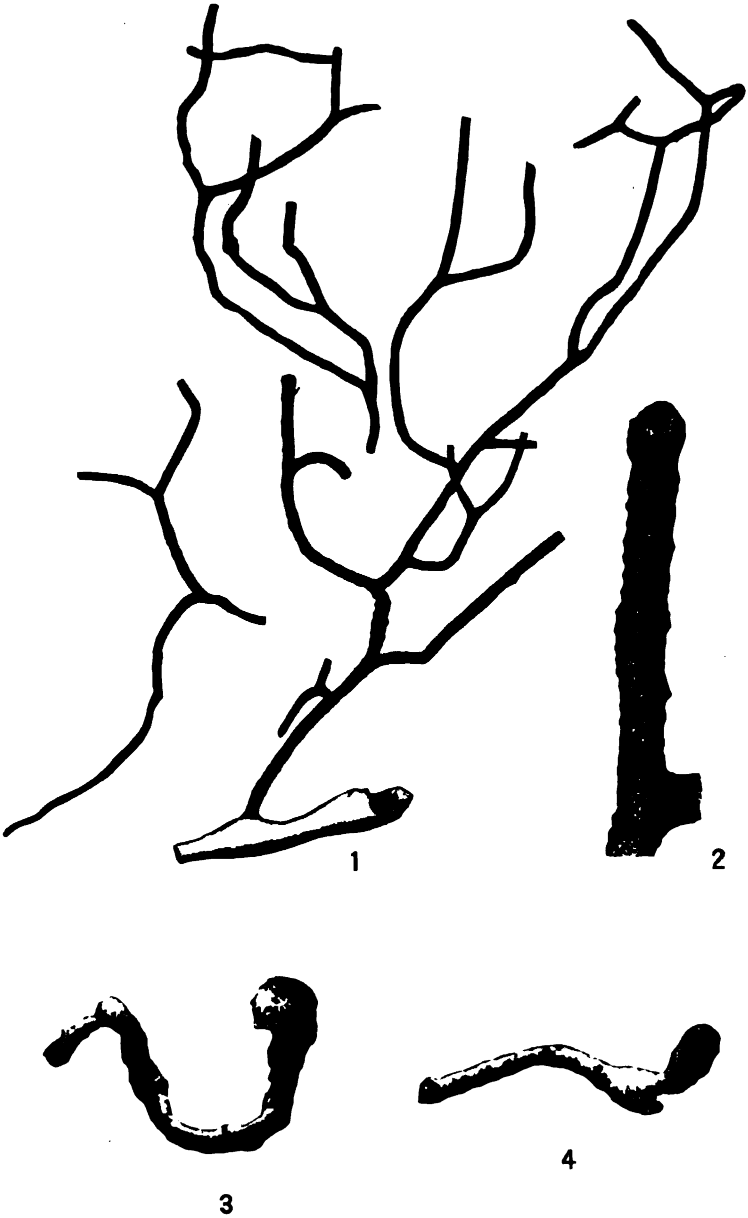
ASTRORHIZIDAE OF THE ATLANTIC OCEAN.

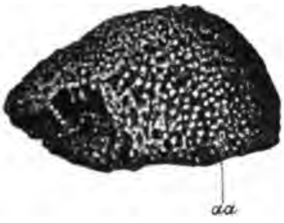
FOR EXPLANATION OF PLATE SEE PAGE 107.



ASTRORHIZIDAE OF THE ATLANTIC OCEAN.

FOR EXPLANATION OF PLATE SEE PAGE 107.

UNIV. OF MICH.



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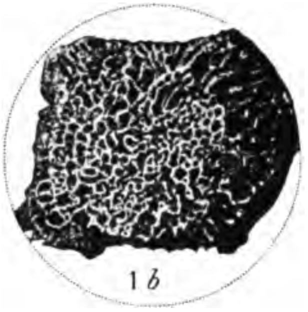

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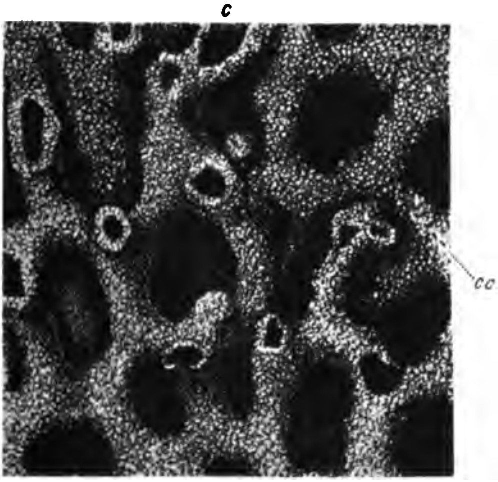

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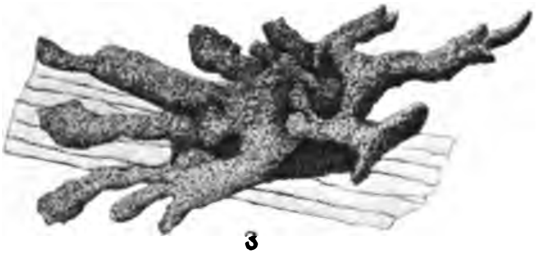

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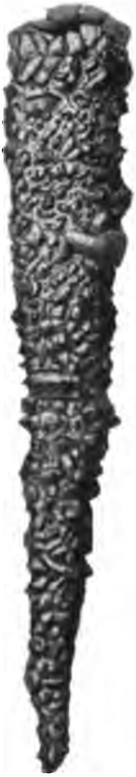
ASTRORHIZIDAE OF THE ATLANTIC OCEAN.

FOR EXPLANATION OF PLATE SEE PAGE 107.

UNIV. OF MICH.



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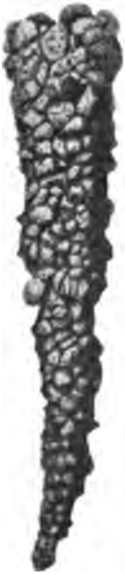

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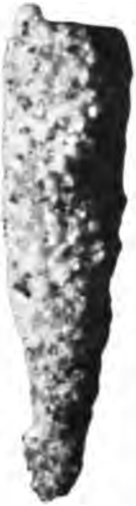

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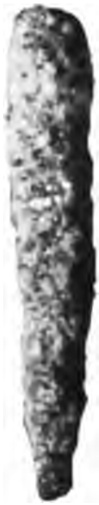

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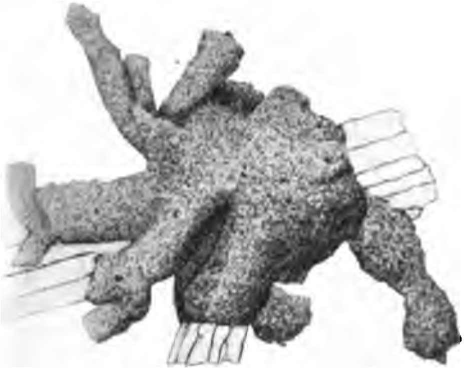

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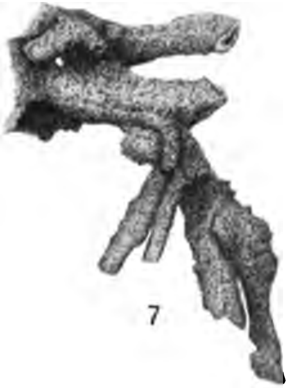

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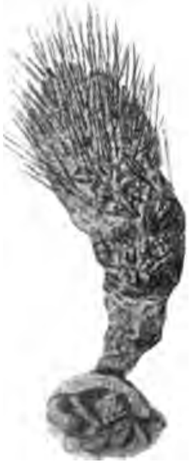
ASTRORHIZIDAE OF THE ATLANTIC OCEAN.

FOR EXPLANATION OF PLATE SEE PAGE 107.

UNIV. OF MICH.



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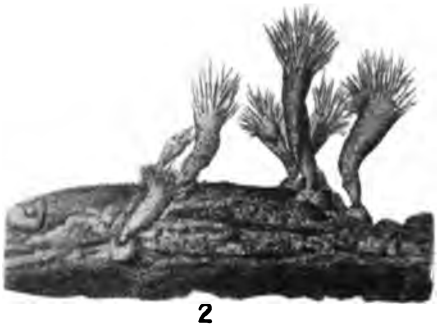

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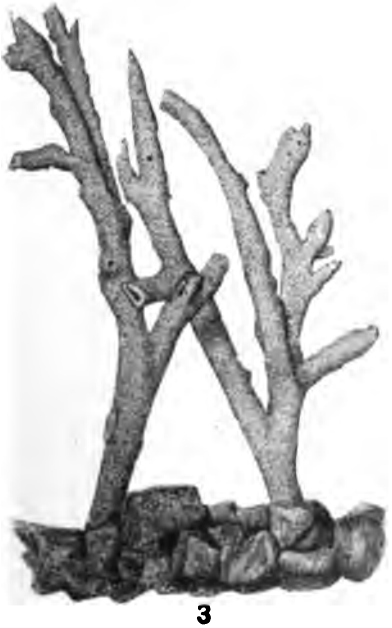

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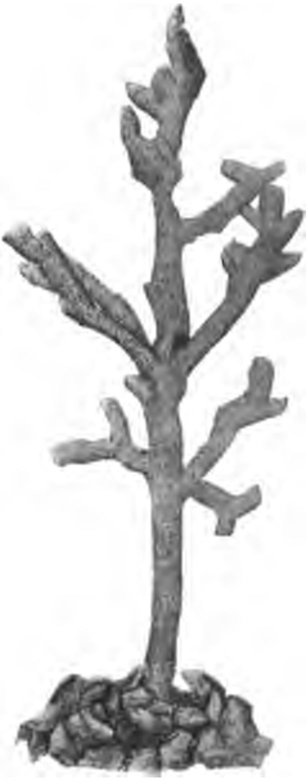

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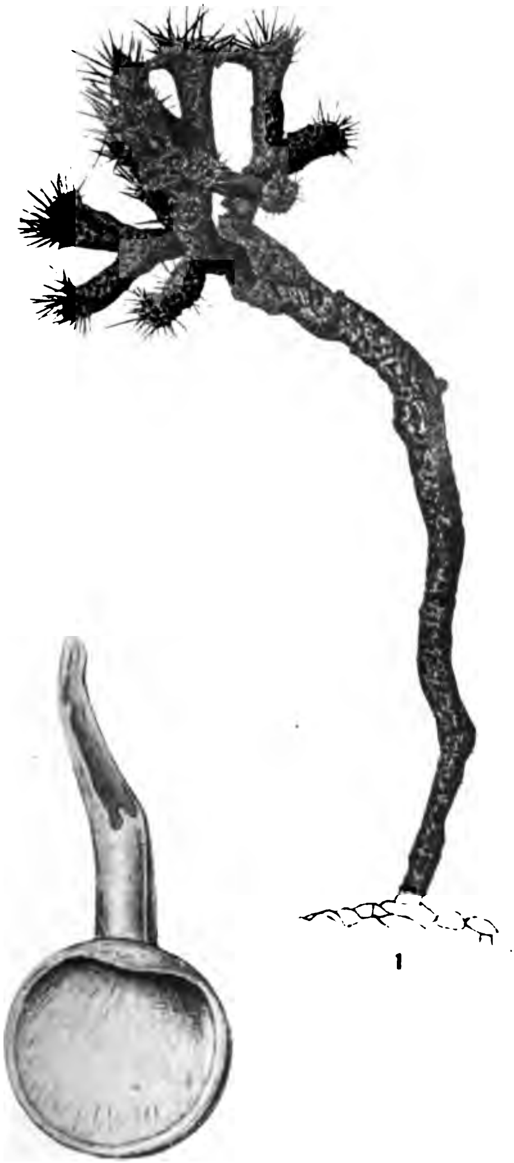
ASTRORHIZIDAE OF THE ATLANTIC OCEAN.

FOR EXPLANATION OF PLATE SEE PAGE 107.

UNIV. OF MICH.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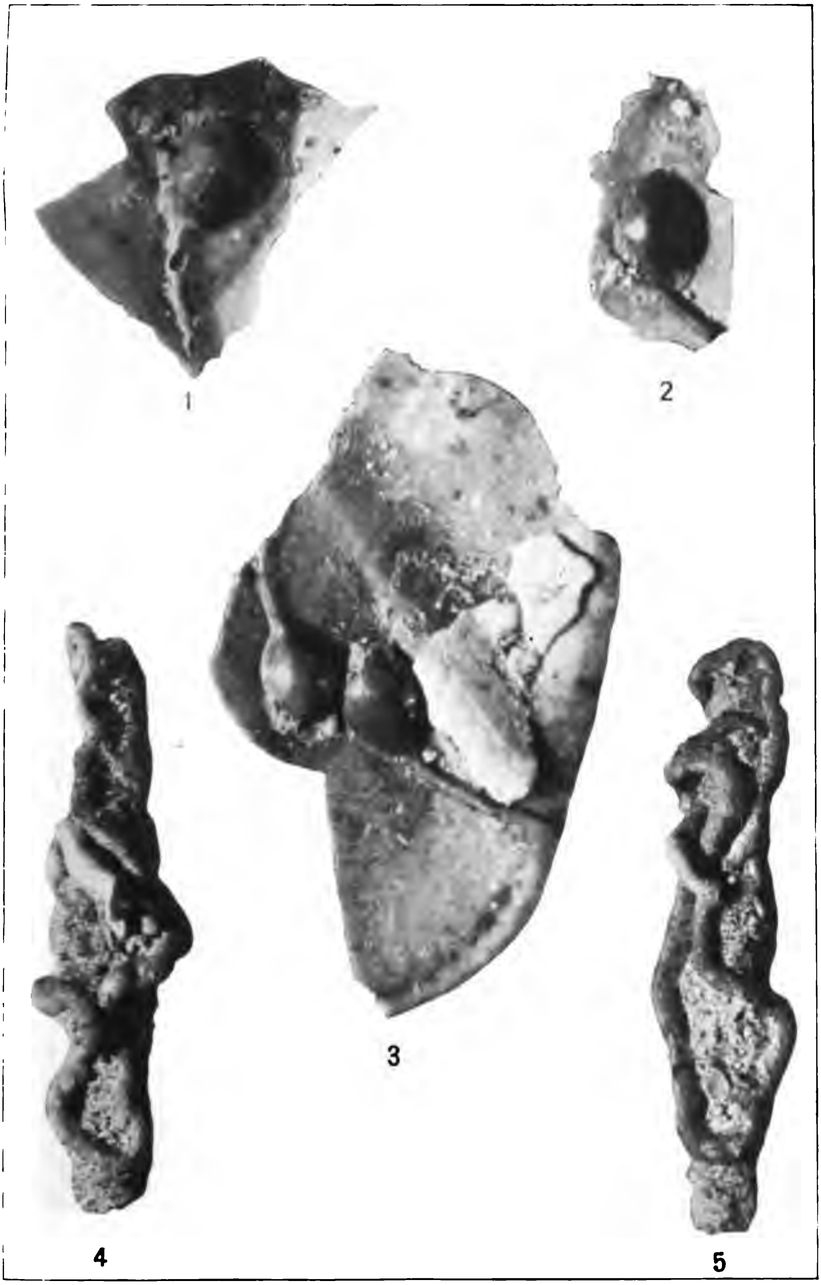
ASTRORHIZIDAE OF THE ATLANTIC OCEAN.

FOR EXPLANATION OF PLATE SEE PAGES 107 AND 108.

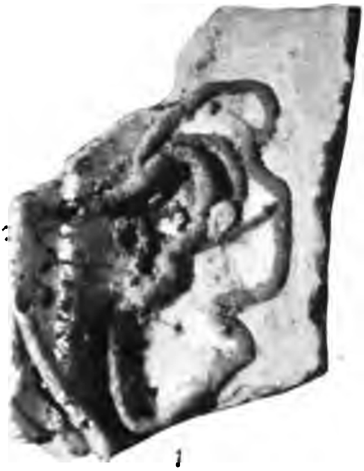
UNIV. OF H.



ASTRORHIZIDAE OF THE ATLANTIC OCEAN.

FOR EXPLANATION OF PLATE SEE PAGE 108.

UNIV. OF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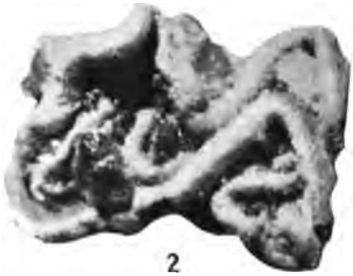
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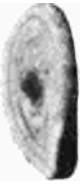
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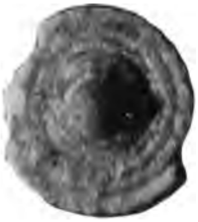
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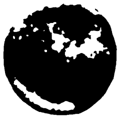
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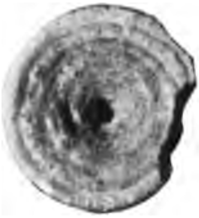
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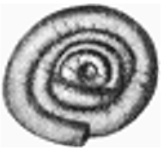
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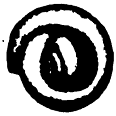
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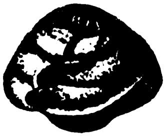
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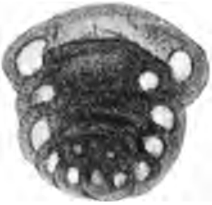
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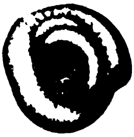
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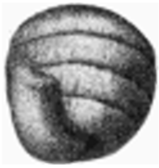
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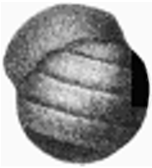
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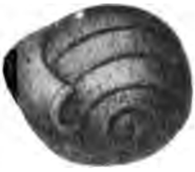
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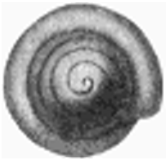
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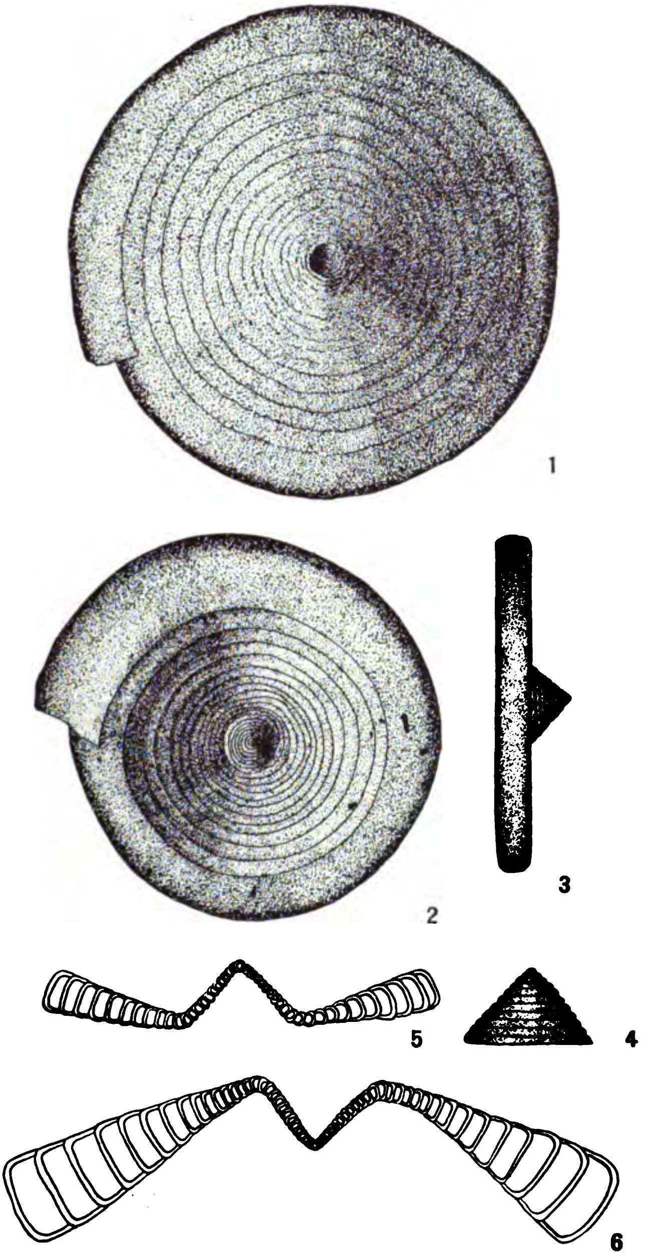
ASTRORHIZIDAE OF THE ATLANTIC OCEAN.

FOR EXPLANATION OF PLATE SEE PAGE 108.

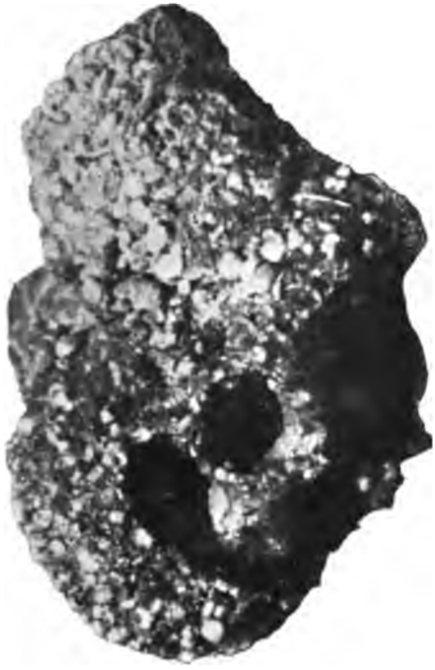
UNIV. OF MICH.



ASTRORHIZIDAE OF THE ATLANTIC OCEAN.

FOR EXPLANATION OF PLATE SEE PAGE 108.

UNIV. OF MICH.



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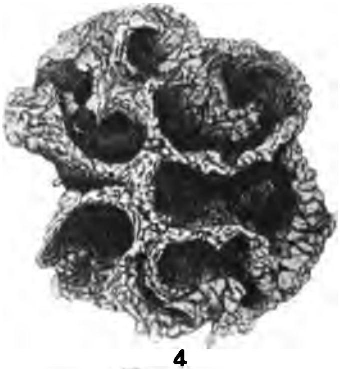

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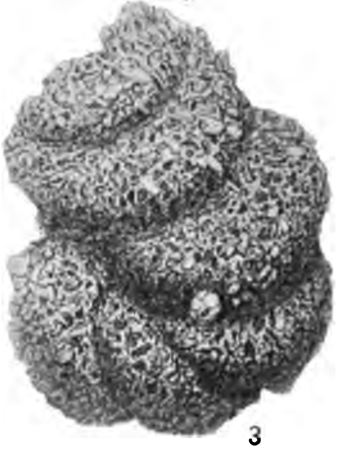

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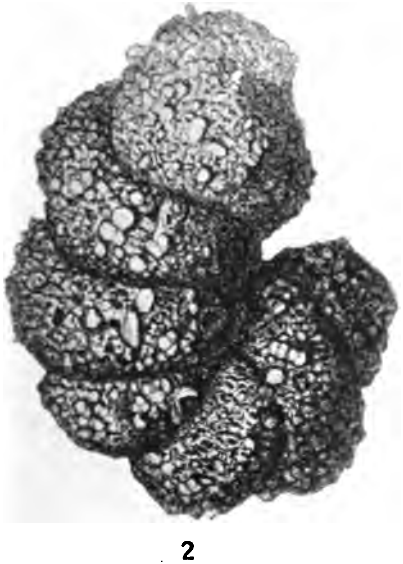

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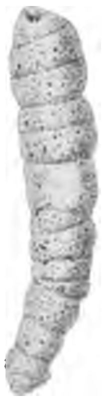

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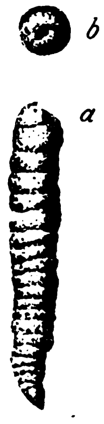

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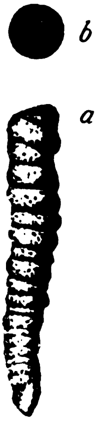

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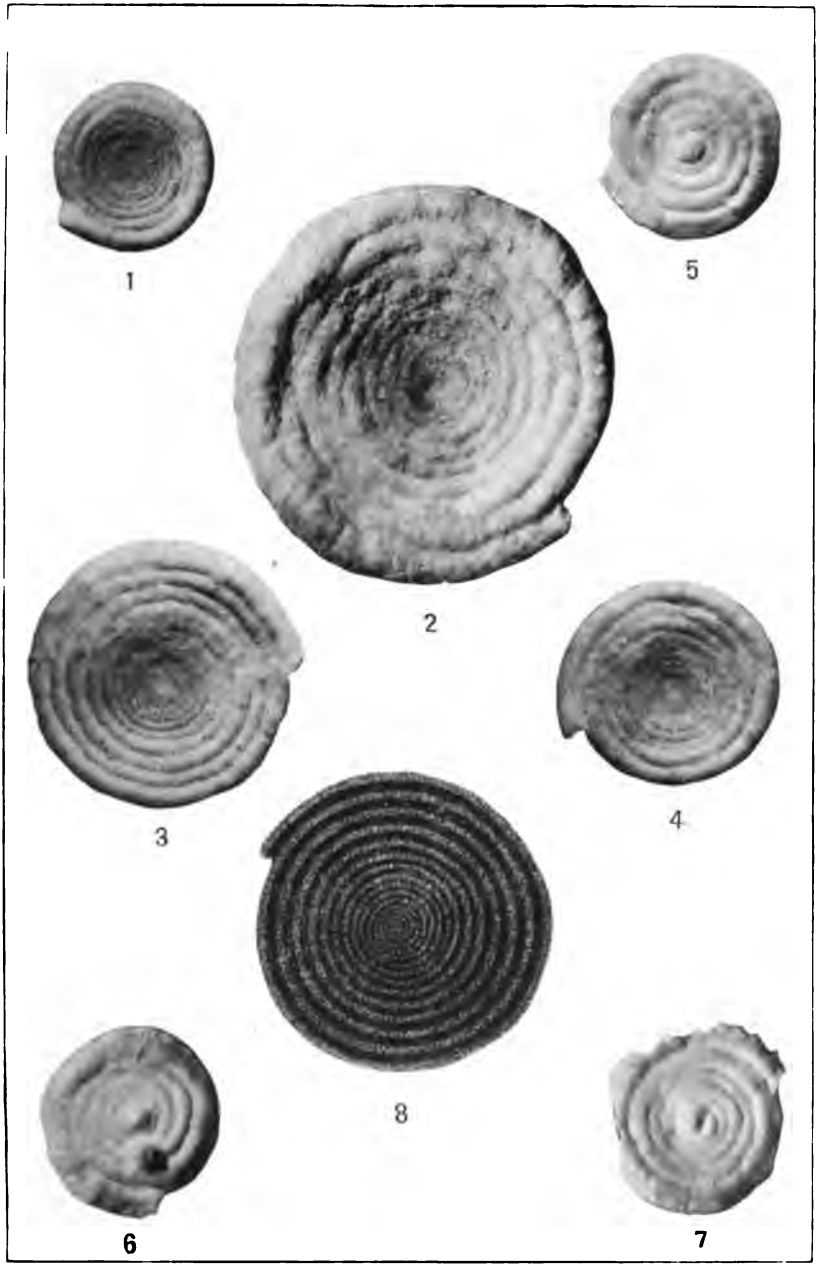
ASTRORHIZIDAE OF THE ATLANTIC OCEAN.

FOR EXPLANATION OF PLATE SEE PAGE 108.

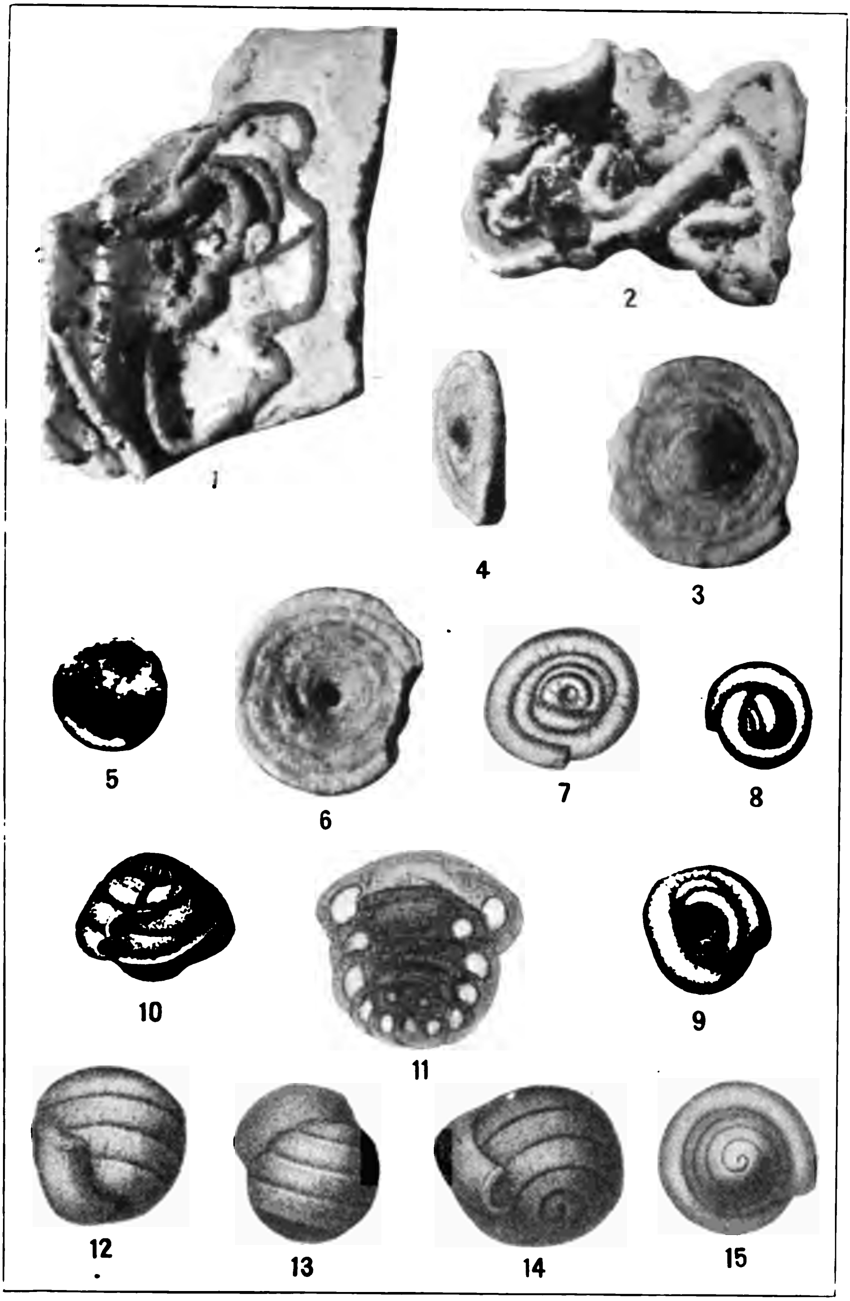
NIV



ASTRORHIZIDAE OF THE ATLANTIC OCEAN.

FOR EXPLANATION OF PLATE SEE PAGE 108.

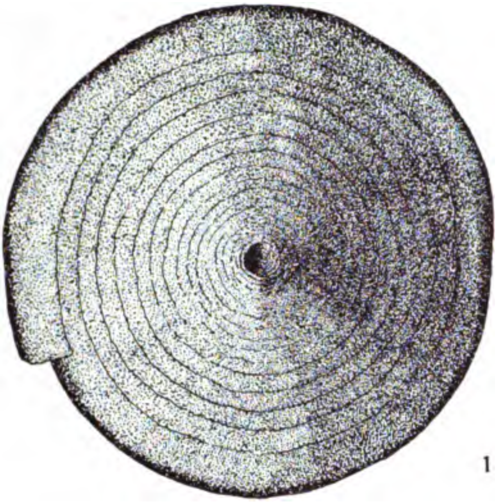
UNIV. OF MICH.



ASTRORHIZIDAE OF THE ATLANTIC OCEAN.

FOR EXPLANATION OF PLATE SEE PAGE 108.

UNIV. OF MICH.



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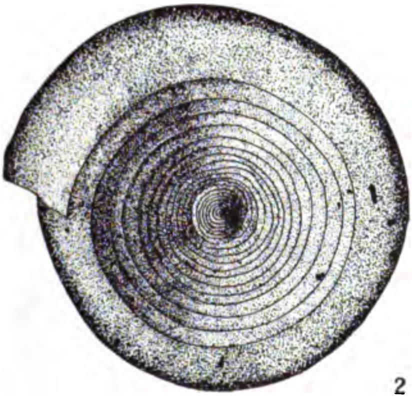

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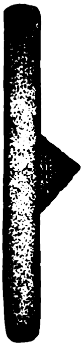

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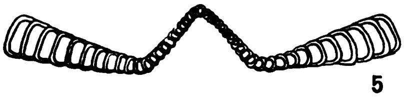

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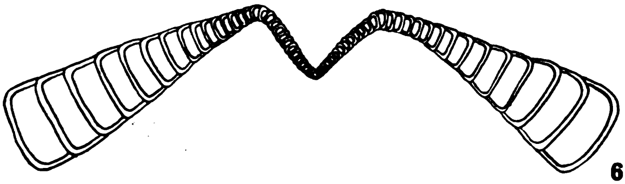

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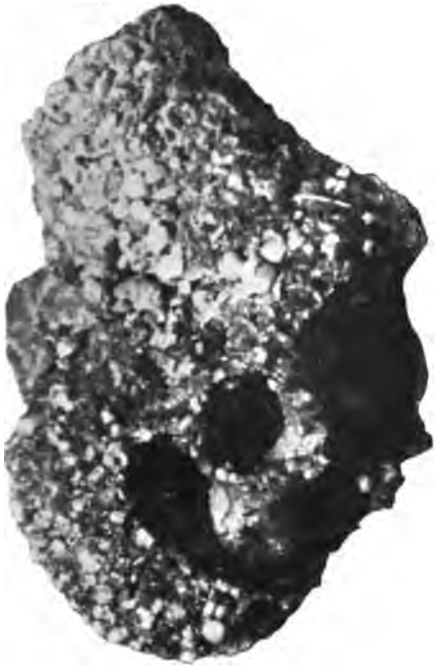
ASTRORHIZIDAE OF THE ATLANTIC OCEAN.

FOR EXPLANATION OF PLATE SEE PAGE 108.

UNIV. OF MICH.



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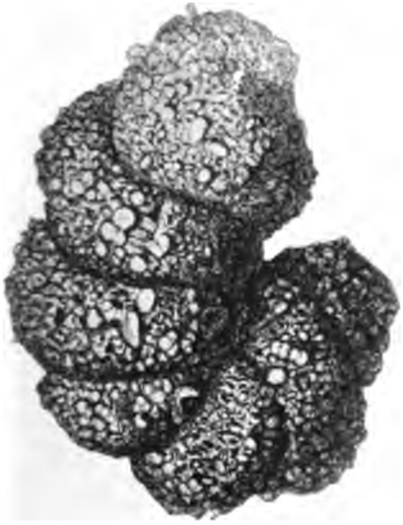

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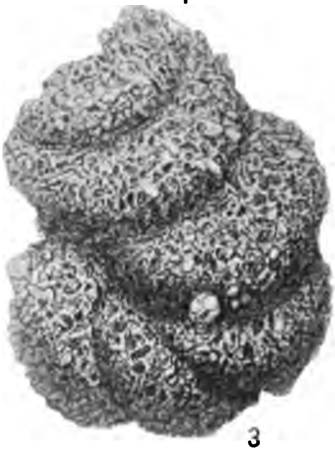

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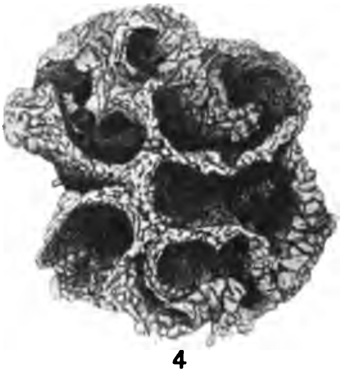

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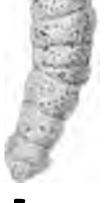

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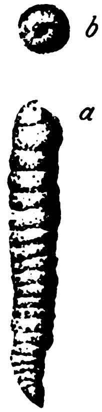

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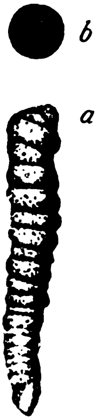

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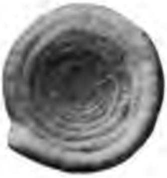
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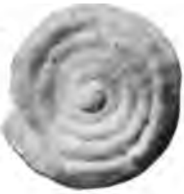
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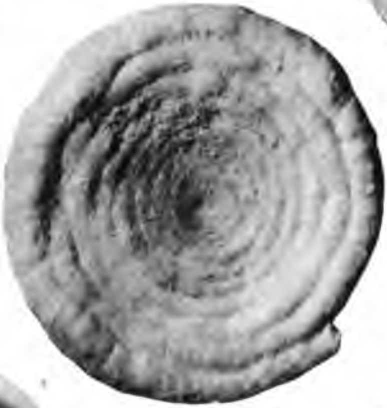
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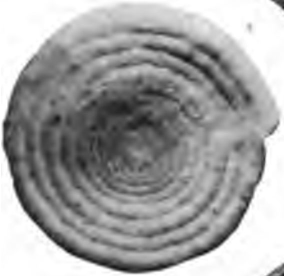
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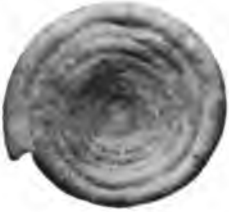
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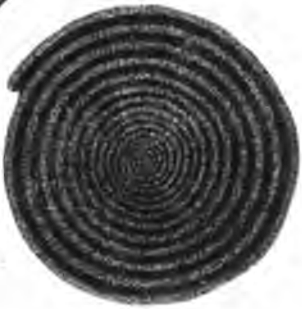
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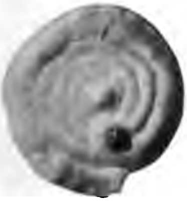
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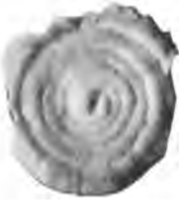
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ASTRORHIZIDAE OF THE ATLANTIC OCEAN.

FOR EXPLANATION OF PLATE SEE PAGE 108.

UNIV. OF MICH.

INTRODUCTION.

This paper is the second part of a work the intent of which is to describe and illustrate the Foraminifera of the Atlantic Ocean, especially those species which have occurred in the waters adjacent to the shores of the United States, including the whole of the Gulf of Mexico and the Caribbean Sea, that being the area in which most of the work of the vessels of the United States engaged in dredging work has been done. This part includes only the family Lituolidae. The first part issued in 1918 included the family Astrorhizidae.

JOSEPH AUGUSTINE CUSHMAN.

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THE FORAMINIFERA OF THE ATLANTIC OCEAN.

LITUOLIDAE.

By JOSEPH AUGUSTINE CUSHMAN,
Of the Boston Society of Natural History.

INTRODUCTION.

This second part of the work on the Atlantic Foraminifera deals entirely with the Lituolidae, the family naturally following the Astrorhizidae, which has already been taken up in Part 1 of this work. The same arrangement of data is here followed. The classification is that adopted in Part 1 of my work on the North Pacific Foraminifera. The distribution of various species shows perhaps more clearly than in Part 1 the faunal areas developed in the western Atlantic.

SYSTEMATIC PART.

A systematic presentation of the various groups of the families follows:

Family 3. LITUOLIDAE.

Test consisting typically of two or more chambers connected with one another, arranged in a linear, planospiral, or trochoid, coiled or irregular series; wall of agglutinated material, the relative amounts of cement and foreign material varying greatly; apertures usually one to each chamber, but sometimes several.

Typical tests of this family are clearly of agglutinated material from which they differ from certain parallelisms in other families. The cement is characteristically ferruginous, a reddish brown in color, although occasionally specimens occur where the entire test is whitish and in numerous species, especially in fresh or alcoholic specimens or sometimes in dried material, the portion of the test next the aperture is often whitish. Throughout the family as here modified the test is composed of two or more chambers with a definite proloculum. The exception to this is the case of very large megalospheric specimens of *Hormosina globulifera*, for instance, where there is but a single chamber instead of the several chambers of the typical microspheric test.

There seems to be a definite development of complexity of structure from the linear series of *Reophax* and *Hormosina* through the close-coiled planospiral *Haplophragmoides* to the uncoiled *Ammobaculites* in the more highly developed species of which the early coiling is very much reduced.

The classification of the family and the various genera used in an earlier work[1] is here followed. The need for these changes seems very evident on a further study of the material from the Atlantic. The idea of keeping separate the agglutinated tests from others of similar form but of secreted calcareous material is also strengthened by further study.

As already noted in the previous part on the Astrorhizidae the distribution of certain species seems to be very limited. Certain species described from the European side of the Atlantic have not been found on the American side, and the reverse is true in a few cases. Certain of the species of the western Atlantic seem to be related to those of the Indo-Pacific.

Subfamily 1. ASCHEMONELLINAE.

Test composed of agglutinated material, divided irregularly into chambers without definite plan of arrangement.

Both species of *Aschemonella* from the Atlantic are identical with those from the Pacific and are primitive in character. The irregularly placed apertures and the budding off of new chambers without definite arrangement are both primitive characters, and on this basis are separated from the rest of the family.

Genus ASCHEMONELLA H. B. Brady, 1879.

Astrorhiza (part) NORMAN, Proc. Roy. Soc., vol. 25, 1876, p. 213.

Aschemonella H. B. BRADY, Quart. Journ. Micr. Sci., vol. 19, 1879, p. 42.—BÜTSCHLI, in Bronn, Klassen und Ordnungen des Thierreichs, vol. 1, 1880, p. 195.—CHAPMAN, The Foraminifera, 1902, p. 126.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 80.—Type, *Aschemonella catenata* (Norman)= *Astrorhiza catenata* Norman.

Description.—Test free, composed of a number of tubular or inflated chambers in a single or branching series, size and form irregular, walls arenaceous, firm, thin, apertures often several at the end of the tubular necks.

The following species are recorded from the Atlantic, both being essentially deep-water species:

ASCHEMONELLA RAMULIFORMIS H. B. Brady.

Plate 1, fig. 1.

Aschemonella ramuliformis H. B. BRADY, Rep. Voy, *Challenger*, Zoology, vol. 9. 1884, p. 273, pl. 27, figs. 12-15.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt, 1, 1910, p. 81, fig. 110.—PEARCY, Trans. Roy. Soc. Edinburgh, vol. 49, 1914, p. 1005.—HERON-ALLEN and EARLAND, Trans. Zool. Soc. London, vol. 20, 1915, p. 610, pl. 46, figs. 18, 19.

Description.—"Test free, elongate; forming an irregular, more or less branched, sometimes segmented tube, with numerous apertures, lateral and terminal. Walls very thin, but hard and firmly cemented;

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[1] Cushman, Foraminifera of the North Pacific, Bull. 71, U. S. Nat. Mus., pts. 1-6, 1910-1917.

exterior only slightly rugose, interior surface smooth. Length, ⅓ inch (8 mm.)."

Distribution.—Scattered Atlantic stations, mostly from considerable depths, are the following: *Challenger* stations, 44, west of our own coast, latitude 37° 25′ N.; longitude 71° 40′ W., depth, 1,700 fathoms (3,109 meters); bottom temperature, 36.2° F. (2.3° C.); station 85, off the Canary Islands, latitude 28° 42′ N., longitude 18° 06′ W., depth, 1,125 fathoms (2,057 meters); station 348, off the coast of Africa, just north of the equator, latitude 3° 10′ N., longitude 14° 51′ W., depth, 2,450 fathoms (4,480 meters), and station 325, South Atlantic, east of Buenos Aires, 1,900 fathoms (3,475 meters), bottom temperature 32° F. (0° C.). Pearcey records it as rare from one *Scotia* station in the Antarctic, 420, latitude 69° 33′ S., longitude 15° 19′ W., in 2,620 fathoms (4,791 meters).

In the *Albatross* material I have found it but once—from D2150, in the western Caribbean, off Central America, in 382 fathoms, (699 meters). This specimen is typical, branching, with very elongate cylindrical branches, the walls thin and firm, with some sponge spicules embedded in the exterior. The specimen measures nearly 7 mm. in length.

Brady's figures in the *Challenger* Report show the interior walls dividing the chambers from one another.

Aschemonella ramuliformis—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°*F.*		
10642	U.S.N.M.	1	D2150...	13 34 45 N.; 81 21 10 W..	382	45.75	wh. crs. s....	Rare.

ASCHEMONELLA CATENATA (Norman).

Plate 1, figs. 2–4.

Astrorhiza catenata Norman, Proc. Roy. Soc., vol. 25, 1876, p. 213.

Aschemonella catenata H. B. Brady, Quart. Journ. Micr. Sci., vol. 19, 1879, p. 42, pl. 4, figs. 12, 13; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 271, pl. 27, figs. 1–11; pl. 27 A, figs. 1–3.—Millett, Journ. Roy. Micr. Soc., 1899, p. 252, pl. 4, figs. 5, 6.—Chapman, The Foraminifera, 1902, p. 126, pl. 6, fig. 1.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 81, fig. 111–113.—Pearcey, Trans. Roy. Soc. Edinburgh, vol. 49, 1914, p. 1005.

Aschemonella scabra H. B. Brady, Quart. Journ. Micr. Sci., vol. 19, 1879, p. 44, pl. 3, figs. 6, 7.

Description.—"Test free, irregularly branched; chambers numerous, inflated, variable in size and contour, usually with several tubulated orifices, each of which may produce a fresh segment. Walls thin, compactly built, exterior more or less rough, often acerose, with partially embedded sponge-spicules; interior smooth. Complete specimens sometimes $\frac{5}{12}$ inch (10.5 mm.) in length."

Distribution.—Norman originally described this species from material dredged at the entrance to Davis Strait. From the *Challenger* records there are seven Atlantic stations for this species, as follows: Station 5, latitude 24° 20′ N.; longitude 24° 28′ W., 2,740 fathoms (5,011 meters); station 23, latitude 18° 26′ N.; longitude 63° 29′ W., 450 fathoms (823 meters); station 24, latitude 18° 38′ 30″ N.; longitude 65° 05′ 30″ W., 390 fathoms (713 meters); station 85, latitude 28° 42′ N.; longitude 18° 06′ W., 1,125 fathoms (2,057 meters); station 98, latitude 9° 21′ N.; longitude 18° 28′ W., 1,750 fathoms (3,200 meters); station 120, latitude 8° 37′ S.; longitude 34° 28′ W., 675 fathoms (1,234 meters); station 323, latitude 35° 39′ N.; longitude 50° 47′ W., 1,900 fathoms (3,475 meters).

Pearcey recorded this with the preceding species from *Scotia* station 420 from the Antarctic, latitude 69° 33′ S.; longitude 15° 19′ W., in 2,620 fathoms (4,791 meters).

In the *Albatross* material it has occurred on the eastern coast of the United States from latitude 40° southward and at one station in the western part of the Caribbean. These *Albatross* stations range in depth from 399 to 2,045 fathoms (730 to 3,740 meters) and the bottom temperatures from 36.8 to 39.1° F. (2.6 to 3.8° C.).

Most of the material from the Atlantic coast is very irregular in contour and most closely resembles Brady's plate 27, figures 5–8, with numerous stolon-like processes. In this connection it should be noted that the complete specimens figured by Brady, *Challenger* Report, plate 27A, figures 1–3, are, if the magnification is correctly given, about the size of a single chamber of the form I have seen and that figured by Brady on plate 27.

The various forms of the chambers given would indicate a primitive organism which has not acquired a fixity of shape for its test, but gives off numerous apertures and new chambers at various places. Such indications seem to confirm the idea of placing this genus in a subfamily by itself as the most primitive of the several chambered forms included in the Lituolidae.

The color in the specimens I have had has invariably been a light gray. The walls are very thin, but are firmly cemented.

The species is known from both the North and South Pacific, and Millett has recorded rounded specimens from the Malay Archipelago. The various forms from different areas would suggest that more than one species or variety may be present with corresponding limitations of distribution, but specimens are never numerous at any of the stations from which I have had material.

Aschemonella catenata—*material examined.*

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
10137	U.S.N.M.	1	D2038...	38 30 30 N.; 69 08 35 W..	2,033	....	glob. oz.....	Rare.
10138	U.S.N.M.	1	D2097...	37 56 20 N.; 70 57 30 W..	1,917	....	glob. oz.....	Rare.
10139	U.S.N.M.	1	D2204...	39 30 30 N.; 71 44 30 W..	728	39.1	br. m.......	Rare.
10140	U.S.N.M.	4	D2226...	37 00 00 N.; 71 54 00 W..	2,045	36.8	glob. oz.....	Few.
10141	U.S.N.M.	1	D2234...	39 09 00 N.; 72 03 15 W..	810	38.6	gn. m.......	Rare.
10142	U.S.N.M.	2	D2355...	20 56 48 N.; 86 27 00 W..	399	....	yl. oz.......	Rare.
10143	U.S.N.M.	1	D2531...	40 42 00 N.; 66 33 00 W..	852	38.4	gy. m.......	Rare.
10144	U.S.N.M.	1	D2678...	32 40 00 N.; 76 40 30 W..	731	38.7	lt. gy. oz....	Rare.

Subfamily 2. REOPHACINAE.

Test composed of agglutinated material, sand grains, sponge spicules, tests of other foraminifera, etc., with a varying amount of cement, chambers in a linear series, aperture usually single and at the distal end of the chamber but occasionally at the side, rarely multiple or cribrate.

This subfamily includes numerous species of *Reophax*, *Hormosina*, and *Haplostiche*. The chambers vary in relative size and position, usually being in a straight series but occasionally being oblique or irregularly curved, either overlapping strongly or on the other extreme remotely placed with long tubular connections between the chambers. There seems to be some selective power in various species, sand grains, sponge spicules, and other foraminiferal tests being used while in one deep water species, *Reophax membranaceous* the test is largely chitinous, thin, and nearly transparent.

Genus REOPHAX Montfort, 1808.

Reophax Montfort (type, *R. scorpiurus* Montfort), Conch. Syst., vol. 1, 1808, p. 330, 83me genre.—H. B. Brady (part), Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 289.—Eimer and Fickert, Zeitschr. Wiss. Zool., vol. 65, 1899, p. 675.—Chapman, The Foraminifera, 1902, p. 137.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 82.

Nodosaria d'Orbigny (not of Lamarck), 1812 (part), Ann. Sci. Nat., vol. 7, 1826, p. 255.—Terquem, Mem. Acad. Imp. Metz, vol. 51, 1870, p. 354.

Lituola Parker and Jones (part), Philos. Trans., vol. 155, 1865, p. 407.—Parker, Can. Nat., vol. 5, 1870, pp. 177, 180.—Parker, Jones, and H. B. Brady, Ann. Mag. Nat. Hist., ser. 4, vol. 8, 1871, p. 159.—Siddall, Proc. Chester Soc. Nat. Sci., pt. 2, 1878, p. 47.—Bütschli, in Bronn, Klassen und Ordnungen des Thierreichs, vol. 1, 1880, p. 192.

Haplostiche Schwager (not of Reuss, 1861), Jahr. Ver. Vet. Nat. Württemburg, vol. 21, 1865, p. 92.

Nodulina Rhumbler, Nachr. Kön. Ges. Wiss. Göttingen, 1895, p. 85.

Description.—Test free, composed of chambers in a linear series, usually joined end to end in a straight or slightly curved line, ranging from closely overlapping chambers to remotely separated ones with stoloniferous connections between, chambers few or numerous, wall of sand grains, mica scales, sponge spicules, chitinous or of tests of other foraminifera; chambers undivided, aperture simple, terminal, at the distal end of the last-formed chamber.

The genus by some authors is allowed to include the single chambered forms which are here included in the family Astrorhizidae under the genus *Proteonina* Williamson. As here used it includes only the multiple chambered species with undivided chambers and single oral aperture.

REOPHAX SCORPIURUS Montfort.

Plate 1, figs. 5–7.

"*Orthoceras*"?, SOLDANI, Testaceographica, vol. 1, 1795, p. 239, pl. 162, fig. K.

Reophax scorpiurus MONTFORT, Conch. Syst., vol. 1, 1808, p. 330, 83me genre.—W. B. CARPENTER, The Microscope, ed. 6, 1881, p. 564, fig. 321*e*.—H. B. BRADY, Denkschr. Akad. Wiss. Wien, vol. 42, 1881, p. 99.—HAEUSLER, Quart. Journ. Geol. Soc., vol. 39, 1883, p. 27, pl. 2, fig. 7.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 291, pl. 30, figs. 12, 15–17 (not 13, 14).—BALKWILL and WRIGHT, Trans. Roy. Irish Acad., vol. 28, 1885, p. 328, pl. 13, figs. 5*a*, *b*.—HAEUSLER, Neues Jahrb. für. Min., Beil., vol. 4, 1885, p. 9, pl. 1, figs. 9–16.—A. AGASSIZ, Bull. Mus. Comp. Zoöl., vol. 15, 1888, p. 163, fig. 495 (in text).—H. B. BRADY, PARKER, and JONES, Trans. Zool. Soc., vol. 12, 1888, p. 217, pl. 41, fig. 10 [?].—HAEUSLER, Abh. Schweiz. Pal. Ges., vol. 17, 1890, p. 27, pl. 5, figs. 23–34.—J. WRIGHT, Proc. Roy. Irish Acad., vol. 1, 1891, p. 467.—CHAPMAN, Journ. Roy. Micr. Soc., 1892, p. 320, pl. 5, figs. 4, 5.—EGGER, Abh. Bay. Akad. Wiss. München, vol. 18, 1893, p. 257, pl. 4, fig. 18; pl. 5, figs. 45, 46.—Goës, Köngl. Svensk. Vet. Akad. Handl., vol. 25, No. 9, 1894, p. 24, pl. 5, figs. 158–163; pl. 6, figs. 164–167 (not 168–171).—CHAPMAN, Proc. Zool. Soc. London, 1895, p. 14.—Goës, Bull. Mus. Comp. Zoöl., vol. 29, 1896, p. 26.—FLINT, Rep. U. S. Nat. Mus., 1897 (1899), p. 273, pl. 16, fig. 3.—MILLETT, Journ. Roy. Micr. Soc., 1899, p. 254.—GUPPY, Proc. Inst. Trinidad, vol. 2, 1902, p. 3, pl. 2, fig. 2.—CHAPMAN, The Foraminifera, 1902, p. 137, pl. 7, fig. B; Trans. and Proc. New Zealand Inst., vol. 38, 1906, p. 84.—BAGG, Proc. U. S. Nat. Mus., vol. 34, 1908, p. 126.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 83, figs. 114–116.—AWERINZEW, Mem. Acad. Imp. Sci. St. Petersbourg, ser. 8, vol. 29, No. 3, 1911, p. 15.—RHUMBLER, Foram. Plankton Exped., teil. 1, 1911, pl. 8, figs. 2–5; teil. 2, 1913, p. 470.—HERON-ALLEN and EARLAND, Proc. Roy. Irish Acad., vol. 31, No. 64, 1913, p. 43.—PEARCEY, Trans. Roy. Soc. Edinburgh, vol. 49, 1914, p. 1006.—CHAPMAN, Zöol. Results "Endeavour," 1915, p. 311.—HERON-ALLEN and EARLAND, Trans. Linn. Soc. London, vol. 11, pt. 13, 1916, p. 222.—CUSHMAN, Proc. U. S. Nat. Mus., vol. 56, 1919, p. 598.

Nodosaria (*Dentalina*) *scorpionus* D'ORBIGNY, Ann. Sci. Nat., vol. 7, 1826, p. 255, No. 40.

Lituola scorpiurus H. B. BRADY, Trans. Linn. Soc. London, vol. 24, 1864, p. 467, pl. 48, fig. 5; Nat. Hist. Trans. Northumberland, vol. 1, 1867, p. 96, pl. 12, fig. 3.—DAWSON, Can. Nat., vol. 5, 1870, p. 177, fig. 4.—PARKER, JONES, and H. B. BRADY, Ann. Mag. Nat. Hist., ser. 4, vol. 8, 1871, p. 159, pl. 9, fig. 29.—DAWSON, Amer. Journ. Sci., vol. 1, 1871, p. 206, fig. 4; Ann. Mag. Nat. Hist., ser. 4, vol. 7, 1871, p. 86, fig. 4.

Lituola nautiloida, var. *scorpiurus* PARKER and JONES, Philos. Trans., 1865, p. 407, pl. 15, fig. 48*a*, *b*.—H. B. BRADY, Pal. Soc. Mon., vol. 30, 1876, p. 63, pl. 8, fig. 7.—SCHWAGER, Boll. Reg. Com. Geol. Ital., vol. 8, 1877, p. 26, fig. 87.—BÜTSCHLI, in Bronn, Klassen und Ordnungen des Thierreichs, vol. 1, 1880, p. 192, pl. 5, fig. 18.

Description.—Test consisting of a number of chambers, rapidly increasing in size as added, early chambers more or less indistinct, irregularly arcuate, later ones larger and more distinct, nearly in a straight line; walls of coarse sand grains, rather roughly cemented, surface rough; aperture simple, small, with a short neck.

Length up to 2 mm.

Distribution.—The published records for this species cover most parts of the world from which foraminifera have been recorded, and it is a relief occasionally to find papers like the recent ones of Chapman's on the Foraminifera of the Antarctic Expedition which do not record it. As noted in an earlier paper, [1] the original figures and later poor copies, together with the series given by Brady, have led to a habit of putting under this name all sorts of things which did not seem to fit well elsewhere. That there is a very fairly well-defined species to which the name can be applied has been apparent from a study of the *Albatross* Atlantic material. No material was, however, found in the Gulf of Mexico. The Goës material from D2355 off Yucatan is typical of the more tropical material referred to this species, and even this seems different from the species in cold water in both form, size, and general appearance. In his set of mounted material from this station Goës also included specimens which are *R. bilocularis* Flint.

A have seen typical specimens also in *Goldseeker* material from north of the British Isles.

Reophax scorpiurus—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom-temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
10190	U.S.N.M.	1	D2052.....	39 40 05 N.; 69 21 25 W..	1,098	45	glob. oz......	Rare.
10191	U.S.N.M.	1	D2093.....	39 42 50 N.; 71 01 20 W..	1,000	39	for. S. M....	Rare.
10192	U.S.N.M.	2	D2097.....	37 56 20 N.; 70 57 30 W..	1,917	....	glob. oz.....	Rare.
10193	U.S.N.M.	4	D2111.....	35 09 50 N.; 74 57 40 W..	938	....	gn. m.......	Few.
10194	U.S.N.M.	1	D2150.....	13 34 45 N.; 81 21 10 W..	382	45.75	wh. crs. s...	Rare.
10524	U.S.N.M.	4	D2231.....	38 29 00 N.; 73 09 00 W..	965	36.8	gy. oz.......	Few.
10195	U.S.N.M.	1	D2313.....	32 53 00 N.; 77 53 00 W..	99	57.2	crs. s. bk. sp. brk. sh.	Rare.
10196	U.S.N.M.	6	D2531.....	40 42 00 N.; 66 33 00 W..	852	38.4	gy. m.......	Frequent.
10197	U.S.N.M.	2	H80.......	13 56 35 N.; 63 02 00 W..	684	....	gy. m. for...	Rare.
10198	U.S.N.M.	7	*Goldseeker*.	61 03 00 N.; 2 20 00 W..	875	....	....	Frequent.

REOPHAX PILULIFER H. B. Brady.

Plate 2, fig. 1.

Reophax pilulifer H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 292, pl. 30, figs. 18–20.—H. B. Brady, Parker, and Jones, Trans. Zool. Soc. London, vol. 12, pt. 7, 1888, p. 217, pl. 41, figs. 5–8(?).—Chapman, Proc. Zool. Soc. London, 1895, p. 15.—Goës, Bull. Mus. Comp. Zoöl., vol. 29, 1896, p. 27.—Flint, Rep. U. S. Nat. Mus., 1897 (1899), p. 273, pl. 18, fig. 1.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 85, figs. 117, 118.—Pearcey, Trans. Roy. Soc. Edinburgh, vol. 49, 1014, p. 1007.

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[1] Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 85

Description.—Test composed of a few (3–5) subglobose chambers in a straight or more commonly curved line, each as added much larger than the preceding; wall of coarse sand grains with a rather neat exterior, apertural end with a slight protuberance and a smaller aperture; color reddish or yellowish brown or gray.

Length up to 2.5 mm.

Distribution.—Brady had this species from five *Porcupine* stations in the North Atlantic west and southwest of Ireland and from a few *Challenger* stations in deep water, off the eastern coast of the United States, near the Azores, northeast of Puerto Rico, off the coast of South America, off Brazil and Buenos Aires, off the coast of Africa, and off the Cape of Good Hope.

Pearcey records it from several stations in the Antarctic; Brady, Parker, and Jones record it from the Abrohlos Bank off Brazil, but their figured material does not seem to belong to this species. It is also known from various parts of the Pacific (Brady, Goës, Cushman).

I have seen a set of this species from *Porcupine* station 19, selected by W. B. Carpenter and now in the United States National Museum. This shows a short, but large, robust species entirely unlike anything found on our coast, so far as I have seen material. A smaller form which in general resembles this was found at five stations to the northeastward of that recorded in the *Challenger* Summary of Results, station 44, and two *Albatross* stations in the northern part of the Gulf of Mexico. Flint's material was from *Albatross* D2760, off Bahia, Brazil, in 1,019 fathoms (1,864 meters).

Reophax pilulifer—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°*F.*		
10183	U.S.N.M.	1	D2038...	38 30 30 N.; 69 08 35 W..	2,033	....	glob. oz.....	Rare.
10184	U.S.N.M.	10	D2097...	37 56 20 N.; 70 57 30 W..	1,917	....	glob. oz.....	Common.
10185	U.S.N.M.	1	D2097...	37 56 20 N.; 70 57 30 W..	1,917	....	glob. oz.....	Rare.
10186	U.S.N.M.	4	D2377...	27 07 30 N.; 88 08 00 W..	210	67	gy. m.......	Few.
10187	U.S.N.M.	1	D2394...	28 38 30 N.; 87 02 00 W..	420	41.8	gy. m.......	Rare.
10188	U.S.N.M.	3	D2568...	39 15 00 N.; 68 08 00 W..	1,781	36.9	gy. oz.......	Few.
10189	U.S.N.M.	1	D2572...	40 29 00 N.; 66 04 00 W..	1,769	37.8	gy. oz.......	Rare.
6267	U.S.N.M.	10+	*Porcupine.* 19.	54 53 00 N.; 10 56 00 W..	1,360	37.4	glob. oz.....	Common.

REOPHAX CURTUS, new species.

Plate 2, figs. 2, 3.

Reophax scorpiurus Goës (part) (not *R. scorpiurus* Montfort), Köngl. Svensk. Vet. Akad. Handl., vol. 25, No. 9, 1894, p. 24, pl. 5, figs. 160–163.

Description.—Test short and thick, composed typically of three chambers, increasing rapidly in size as added, last-formed chamber making up a large proportion of the test, fusiform or elliptic, axis of the test straight or more often slightly curved; wall composed of angular quartz sand grains with a considerable amount of gray cement between; apertural end slightly tapering, without a definite neck, the aperture being an opening between three or more sand grains at the end of the chamber.

Length up to 2 mm.

Distribution.—Type specimen (U.S.N.M. No. 10669) from *Albatross* station D2458 in 89 fathoms (163 meters) north of the Grand Banks. At this station such specimens were common. It also occurred at one station off our southern Atlantic coast, and I have specimens from comparatively shallow water in Passamaquoddy Bay, Maine.

The species is shorter, thicker, and fewer chambered than *R. scorpiurus*, the chambers fewer and longer than in *R. pilulifer* and different in the material of the wall and in the number and shape of the chambers from *R. bilocularis*.

It seems to be a species of cold waters and moderate depths.

Goës figures this species under the name of *R. scorpiurus* in the reference noted above. The specimens were from the Greenland Sea in 35–215 meters and from the Skagerack in 250 meters.

Reophax curtus—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
10668	U.S.N.M.	3	D2425...	36 20 24 N.; 74 46 30 W..	119	51.5	dk. gy. m. fne. s.	Few.
10669	U.S.N.M.	10+	D2458...	46 48 30 N.; 52 34 00 W..	89	29.5	s. gn. m......	Common.

REOPHAX AGGLUTINATUS Cushman.

Plate 2, figs. 4, 5.

Reophax scorpiurus H. B. Brady (part) (not *R. scorpiurus* Montfort), Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, pl. 30. fig. 13.

Reophax agglutinatus Cushman, Proc. U. S. Nat. Mus., vol. 44, 1913, p. 637, pl. 79, fig. 6.

Description.—Test elongate, tapering, widest near the apertural end, composed of a few chambers (4–6), subglobular or elliptical, wall made of other foraminiferal tests, usually *Globigerina*, firmly cemented by a yellowish gray cement, apertural end truncate with a small aperture without a definite neck.

Length up to 4 mm.

Distribution.—Typical specimens from station D2550 off the northeastern coast of the United States in 1,081 fathoms (1,977 meters). It has also occurred at other stations in the same region and was probably present but not recorded from still others.

It differs in its wall and cement from typical *R. scorpiurus* the yellowish gray cement being peculiar. This species was first described from the Philippines but is apparently widely distributed.

Reophax agglutinatus—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°*F.*		
10665	U.S.N.M.	1	D2228...	37 25 00 N.; 73 06 00 W..	1,582	36.8	br. m.......	Rare.
10666	U.S.N.M.	2	D2531...	40 42 00 N.; 66 33 00 W..	852	38.4	gy. m.......	Rare.
10667	U.S.N.M.	2	D2550...	39 44 30 N.; 70 30 45 W..	1,081	38.5	br. m.......	Rare.

REOPHAX AGGLUTINATUS Cushman, var. GLOMERATUS, new variety.

Plate 2, fig. 6; plate 3, figs. 1, 2.

Description.—Variety differing from the typical in the larger size, the very distinct globular chambers rapidly increasing in size; interior smooth, chambers in a straight or much-curved line.

Length up to 10 mm.; diameter of largest chamber, 4.5 mm.

Distribution.—Type specimen (U.S.N.M. No. 10656) from D2043 off the northeastern coast of the United-States in 1,467 fathoms (2,683 meters). At this station it is abundant and occurs at five other stations in the same general region.

This is a much larger form than the typical, and in the globular chambers and rapidly increasing size is distinct. So far as the material shows, it is closely limited to this area between latitude 38° 20′ N. and 40° 09′ N. and longitude 67° 09′ W. and 70° 57′ W. The average depth is over 1,500 fathoms (2,743 meters). This may be specifically distinct from *R. agglutinatus*, but until more is known of the distribution of the two I prefer to leave it as a variety.

Reophax agglutinatus, var. glomeratus—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°*F.*		
10655	U.S.N.M.	1	D2035...	39 26 16 N.; 70 02 37 W..	1,362	....	glob. oz.....	Rare.
10656	U.S.N.M.	10+	D2043...	39 49 00 N.; 68 28 30 W..	1,467	38.5	glob. oz.....	Abundant.
10657	U.S.N.M.	2	D2221...	39 05 30 N.; 70 44 30 W..	1,525	36.9	gy. oz.......	Few.
10658	U.S.N.M.	3	D2571...	40 09 30 N.; 67 09 00 W..	1,356	37.8	gy. glob. oz .	Few.
10659	U.S.N.M.	1	D2713...	38 20 00 N.; 70 08 30 W..	1,859	....	br. oz.......	Rare.
10660	U.S.N.M.	3	D2716...	38 29 30 N.; 70 57 00 W..	1,631	....	br. oz. for...	Few.

REOPHAX BILOCULARIS Flint.

Plate 3, figs. 3, 4.

Reophax bilocularis FLINT, Rep. U. S. Nat. Mus., 1897 (1899), p. 273, pl 17, fig. 2.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 90, fig. 127*a*, *b*.

Description.—Test composed of two chambers, each longer than broad and set in a straight line or at an angle, ends rounded, somewhat constricted between; walls of various material, most commonly of tests of other foraminifera, surface more or less irregular, interior fairly smooth, with a yellowish brown cement; aperture at the end of a short tubular neck.

Length up to 2.5 mm.

Distribution.—The type station from which Flint described this species is *Albatross* D2679, off Cape Fear. At this station it is very common. It has occurred somewhat farther northeastward and in the Gulf of Mexico, but nowhere in such numbers as at the type station.

Occasional specimens at the type station show traces of a very small third chamber of the same shape as in ordinary specimens, but the two-chambered specimens are the rule in the great majority of cases. From other specimens that I have seen this seems to have a rather wide distribution, occurring in some numbers in the western Pacific. I recorded the species in the North Pacific just north of Guam.

This may be one of those Indo-Pacific species which reaches eastward into the Gulf of Mexico and adjacent portions of the western Atlantic

Reophax bilocularis—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
10132	U.S.N.M.	2	D2115...	35 49 30 N.; 74 34 45 W..	843	39	m. fne. s....	Few.
10133	U.S.N.M.	3	D2377...	29 07 30 N.; 88 08 00 W..	210	67	gy. m.......	Few.
10134	U.S.N.M.	2	D2678...	32 40 00 N.; 76 40 30 W..	731	38.7	lt. gy. oz....	Few.
10135	U.S.N.M.	10+.	D2679...	32 40 00 N.; 76 40 30 W..	782	38.6	lt. gy. oz....	Common.
10136	U.S.N.M.	1	D2682...	39 38 00 N.; 70 22 00 W..	1,004	....	gn. m. s.....	Rare.

REOPHAX SCOTTII Chaster.

Reophax nodulosa(?) Scott, 8th Ann. Rep't Fisheries Board of Scotland, pt. 3, 1890, p. 314.

Reophax scottii Chaster, First Rep't Southport Soc. Nat. Sci., 1890-91, (1892), p. 57, pl. 1, fig. 1.—Millett, Journ. Roy. Micr. Soc., 1899, p. 255, pl. 4, fig. 13.—Sidebottom, Mem. Proc. Manchester Lit. and Philos. Soc., vol. 49, No. 5, 1905, p. 2: vol. 54, pt. 3, No. 16, 1910, p. 8.—Heron-Allen and Earland, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 44: Trans. Linn. Soc. London, vol. 11, pt. 13, 1916, p. 222.

Description.—Test elongate, somewhat compressed, chambers well separated; walls composed of minute flakes of mica attached to a chitinous membrane, whole test flexible when moist, but very fragile when dry.

Distribution.—This species seems to be a common one about the British Isles in comparatively shallow water on muddy bottoms. Heron-Allen and Earland record it from 10 stations in the Clare

Island region off western Ireland and from 5 stations off the west coast of Scotland. It is known from other stations in the same general region.

Millett records and figures a very slender specimen from the Malay Archipelago under this name, but it seems much more slender and as far as the figure shows has a different structure of the wall, but is recorded as flexible.

A single specimen from station D2003, latitude 37° 16′ 30″ N.; longitude 74° 20′ 36″ W., in 641 fathoms (1,172 meters), is composed largely of mica plates, but has not the other characters of this species.

REOPHAX DISTANS H. B. Brady.

Plate 3, figs. 5, 6.

Reophax distans H. B. BRADY, Quart. Journ. Micr. Sci., vol. 21, 1881, p. 50; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 296, pl. 31, figs. 18–22.—CHAPMAN, Proc. Zool. Soc. London, 1895, p. 15.—GOËS, Bull. Mus. Comp. Zoöl., vol. 29, 1896, p. 27.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 85, fig. 119.—PEARCEY, Trans. Roy. Soc. Edinburgh, vol. 49, 1914, p. 1007.

Description.—Test composed of a few elongate fusiform chambers with slender connecting tubular necks in a straight or irregular line; usually not more than three found attached; wall of sand grains neatly cemented, thin, color reddish brown or gray; apertural end with a tubular neck; aperture circular.

Length of three chambered specimens 5 mm.

Distribution.—The records show that this species is largely confined to deep cold waters. In such situations it is very widely distributed but never very common.

In the Atlantic Brady records it from the Faroe Channel, 355 fathoms (649 meters); off the west coast of Africa in 1,750 fathoms (3,200 meters) and off Buenos Aires in 1,900 fathoms (3,475 meters). Pearcey records it from *Scotia* station 459, latitude 41° 30′ S.; longitude 9° 55′ W., in 1,998 fathoms (3,654 meters). Neither Goës nor Flint recorded it in the Atlantic material of the *Albatross*. The only stations from which I have had it are given below, all between 37° and 40° N. latitude and between 68° and 72° W. longitude in deep cold water. Enough specimens were found at each of these stations to show that its absence elsewhere was not due to cursory examination.

Outside the Atlantic it has been noted in the North and South Pacific and in the Southern Ocean south of Africa and south of Australia. Chapman records it from the Arabian Sea.

It is a very well defined species but is not found whole as the slender stolon-like connections form a point of weakness causing breakage under a slight strain. Two varieties with different distribution are given below.

Reophax distans—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
10108	U.S.N.M.	3	D2038...	38 30 30 N.; 69 08 35 W..	2,033	....	glob. oz.....	Few.
10109	U.S.N.M.	9	D2039...	38 19 26 N.; 68 20 20 W..	2,369	....	glob. oz.....	Few.
10110	U.S.N.M.	6	D2097...	37 56 20 N.; 70 57 30 W..	1,917	....	glob. oz.....	Few.
10111	U.S.N.M.	3	D2226...	37 00 00 N.; 71 54 00 W..	2,045	36.8	glob. oz.....	Few.
10116	U.S.N.M.	10	D2568 ..	39 15 00 N.; 68 08 00 W..	1,781	36.9	gy. oz.......	Few.

REOPHAX DISTANS H. B. Brady, var. TURBO Goës.

Plate 4, fig. 1.

Reophax turbo Goës, Bull. Mus. Comp. Zoöl., vol. 29, 1896, p. 29, pl. 1, figs. 2, 3.

Description.—"Chambers conical trochiform, marginated, the margin on one side somewhat crenulated, the necks slender. One-chambered specimens only open at their two ends have been met with; test thin, firmly constructed of finest sand; surface nearly smooth."

Distribution.—Goës described this variety from two *Albatross* stations in the Gulf of Mexico D2394, latitude 28° 38′ 30″ N.; longitude 87° 02′ W. in 420 fathoms (768 meters) and D2395, latitude 28° 36′ N.; longitude 86° 50′ W., in 347 fathoms (635 meters). I have found a single specimen from the first of these two stations and have examined Goës' type material from the same station.

Although single chambers only have been met with it seems that these are broken from a series both ends showing fracture and are related to *R. distans*.

REOPHAX DISTANS H. B. Brady, var. DELICATULUS, new variety.

Plate 4, fig. 2.

Description.—Chambers subglobular instead of elongate fusiform somewhat longer than wide, the ends broadly rounded, of fine sand, dark reddish brown in color, the tubular connections very slender and not enlarging where they connect with the chambers.

Distribution.—Type specimen from *Albatross* station D2393, U.S.N.M No. 10114. The three stations in the Gulf of Mexico at which this variety was found are close together. In Goës' collection it appears from station D2379 in the same area under the name *Hormosina globulifera*? Brady.

REOPHAX GUTTIFER H. B. Brady.

Plate 3, fig. 7.

Reophax guttifer H. B. Brady, Quart. Journ. Micr. Sci., vol. 21, 1881, p. 49; Proc. Roy. Soc. Edinburgh, vol. 11, 1882, p. 711; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 295, pl. 31, figs. 10–15.—J. Wright, Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 467.—Goës, Köngl. Svensk. Vet. Akad. Handl., vol. 25, No. 9, 1894, p. 26, pl. 6, figs. 192–195.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 88, fig. 123.—Rhumbler, Foram. Plankton Exped., teil 1, 1911, pl. 8, figs. 13–19; teil 2, 1913, p. 472.

Description.—Test elongate, usually straight, composed of several (3–8) chambers usually in a straight line, the earlier ones especially, pyriform with a truncate base, well separated from one another by the slender necks, anterior end tapering; wall of rather coarse sand grains firmly cemented but with a rough exterior; aperture circular at the end of a short cylindrical tapering neck; color yellowish brown.

Length up to 1.6 mm.

Distribution.—Brady records this species from the Faroe Channel in 540 fathoms (987 meters) and from three *Challenger* stations in mid-Atlantic, west of the Azores 1,675 fathoms (3,063 meters), a single doubtful specimen off Palma, Canaries, 1,125 fathoms (2,057 meters) and very typical material from the South Atlantic east of Buenos Aires in 1,900 fathoms (3,475 meters). Goës records it from Spitzbergen.

In the *Albatross* dredgings I have had material from seven stations off the northeastern coast of the United States between latitude 37° and 40° N., and longitude 69° and 74° W. The material from two of these stations is very fine but is small and resembles very closely the figures given by Goës from off Spitzbergen. Except at one station the species is very rare.

It is also known from the North Pacific in deep water.

Reophax guttifer—material examined.

Cat. No.	Coll. of—	No. of specimens	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
10199	U.S.N.M.	2	D2003	37 16 30 N.; 74 20 36 W.	641			Rare.
10200	U.S.N.M.	2	D2037	38 53 00 N.; 69 23 30 W.	1,731	38	glob. oz	Rare.
10201	U.S.N.M.	1	D2038	38 30 30 N.; 69 08 35 W.	2,033		glob. oz	Rare.
10202	U.S.N.M.	1	D2097	37 56 20 N.; 70 57 30 W.	1,917		glob. oz	Rare.
10203	U.S.N.M.	1	D2212	39 59 30 N.; 70 30 45 W.	428	40	gn. m	Rare.
10204	U.S.N.M.	1	D2243	40 10 15 N.; 70 26 00 W.	63	52.4	gn. m	Rare.
10205	U.S.N.M.	9	D2262	39 54 45 N.; 69 29 45 W.	250	41.6	gn. m. s	Few.

REOPHAX GUTTIFER H. B. Brady, var. SPICULILEGA Rhumbler.

Reophax guttifera H. B. Brady, var. *spiculilega* Rhumbler, Foram. Plankton Exped., teil 1, 1911, pl. 8, fig. 20; tiel 2, 1913, p. 473.

Description.—Differs from the type in the wall of the test which has numerous sponge spicules.

Rhumbler records but two specimens and these but end chambers. They were from near St. Vincent, Cape Verde Islands, in 659 fathoms (1,205 meters).

REOPHAX ROBUSTUS Pearcey, var. SEPTENTRIONALIS, new variety.

Plate 4, figs. 3–5.

Description.—Test large, of few chambers (3–4), each nearly spherical and much larger than the preceding, wall very firmly cemented, of coarse angular sand grains, surface roughened by large angular fragments attached to the exterior; chambers distinct, sutures depressed, apertural end without a definite tubular neck; color grayish brown.

Length up to 7 mm.

Distribution.—Type specimen (U.S.N.M. No. 10663) from D2572 off the Georges Banks. It also occurred in this same region at two other stations.

The species described by Pearcey from the Antarctic is similar to this in general characters but all the specimens of this northern variety lack the definite tubular neck and the coloration noted in the species.

Pearcey records the species from *Scotia* station 420 in 2,620 fathoms (4,791 meters) as abundant but not found elsewhere.

Reophax robustus, var. septentrionalis—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
10662	U.S.N.M.	1	D2084...	40 16 50 N.; 67 05 15 W..	1,290	40	bu. m. & s...	Rare.
10663	U.S.N.M.	2	D2572...	40 29 00 N.; 66 04 00 W..	1,769	37.8	gy. oz.......	Rare.
10664	U.S.N.M.	1	D2706...	41 28 30 N.; 65 35 30 W..	1,188	....	gy. oz. for...	Rare.

REOPHAX ADUNCUS H. B. Brady.

Plate 5, fig. 1.

Reophax adunca H. B. Brady, Proc. Roy. Soc. Edinburgh, vol. 11, 1882, p. 715; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 296, pl. 31, figs. 23–26.—Flint, Rep. U. S. Nat. Mus., 1897 (1899), p. 274, pl. 18, fig. 5.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 89, fig. 125.—Chapman, Journ. Linn. Soc. Zoology, vol. 30, 1910, p. 400.—Pearcey, Trans. Roy. Soc. Edinburgh, vol. 49, 1914, p. 1005.

Description.—Test composed of several subglobular, pyriform or slightly compressed chambers arranged in a linear series but not usually in a straight line, more often being somewhat irregular, constrictions between the chambers usually deep, walls thin, composed of sand grains forming a roughened surface; color gray, yellowish or reddish brown.

Length 2.5 mm. or more.

Distribution.—The *Challenger* Atlantic records for this species are station 78, south of the Azores, latitude 37° 26′ N.; longitude 25° 13′ W., in 1,000 fathoms (1,829 meters); station 85 off the Canaries, latitude 28° 42′ N.; longitude 18° 06′ W.; depth 1,125 fathoms (2,057 meters); station 120 off Brazil, latitude 8° 37′ S.; longitude 34° 28′ W., in 675 fathoms (1,234 meters); station 323 east of Buenos Aires, latitude 35° 39′ S.; longitude 50° 47′ W., in 1,900 fathoms (3,475 meters) and station 332 in the South Atlantic, latitude 37° 29′ S.;

longitude 27° 31′ W., in 2,200 fathoms (4,023 meters). Besides these it is recorded by Brady from the Faroe Channel in 540 fathoms (988 meters). Flint recorded it from two stations, one of which, D2338, latitude 23° 10′ N.; longitude 82° 20′ W., depth 189 fathoms (346 meters) in the Gulf of Mexico west of Cuba I have had no material from but have from a near-by station. The *Scotia* obtained it at station 420, latitude 69° 33′ S.; longitude 15° 19′ W., 2,620 fathoms (4,791 meters) in the Antarctic recorded by Pearcey.

In the *Albatross* material, I have had the species from 19 stations, ranging in depth from 167–2,369 fathoms (305–4,332 meters) and bottom temperatures 36.8°–40.1° F. (2.6–4.4° C.), with one station 45° F. (7.2° C.) These are mostly from the region south of Georges Banks and westward but a few continue down the coast and three are in the Gulf of Mexico.

Nearly all of the specimens here included are typical.

This seems to be a primitive species in its lack of fixity of character, the line of direction of attachment of the chambers being often very irregular and the shape of the chambers not uniform or regular. As many as eight chambers are present in some of the specimens but the average is much less. The weakness of the connection of the chambers seems to be the main reason for the small number and the irregularity of the line making the test more easily broken. Chambers are either pyriform or subglobular but are very often somewhat compressd and the connections are not as a rule exactly median but more often in an excentric position. The size of the chambers varies but slightly in most cases. The three figures in the middle of the five of Flint are very typical.

Reophax aduncus—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
10264	U.S.N.M.	1	D2036...	38 52 40 N.; 69 24 40 W..	1,735	38	glob. oz.....	Rare.
10091	U.S.N.M.	1	D2039...	38 19 26 N.; 68 20 20 W..	2,369	....	glob. oz.....	Rare.
10092	U.S.N.M.	1	D2041...	39 22 50 N.; 68 25 00 W..	1,608	38	glob. oz.....	Rare.
10106	U.S.N.M.	1	D2042...	39 33 00 N.; 68 26 45 W..	1,555	38.5	glob. oz.....	Rare.
10093	U.S.N.M.	2	D2043...	39 49 00 N.; 68 28 30 W..	1,467	38.5	glob. oz.....	Rare.
10521	U.S.N.M.	1	D2052...	39 40 05 N.; 69 21 25 W..	1,098	45	glob. oz.....	Rare.
10094	U.S.N.M.	1	D2110...	35 12 10 N.; 74 57 15 W..	516	40	bu. m.......	Rare.
10107	U.S.N.M.	1	D2160...	23 10 31 N.; 82 20 37 W..	167	....	co...........	Rare.
10095	U.S.N.M.	1	D2202...	39 38 00 N.; 71 39 45 W..	515	39.1	gn. m.......	Rare.
10096	U.S.N.M.	5	D2205...	39 35 00 N.; 71 18 45 W..	1,073	38.1	gy. oz.......	Few.
10097	U.S.N.M.	4	D2212...	39 59 30 N.; 70 30 45 W..	428	40	gn. m.......	Few.
10098	U.S.N.M.	4	D2221...	39 05 30 N.; 70 44 30 W..	1,525	36.9	gy. oz.......	Few.
10099	U.S.N.M.	1	D2222...	39 03 15 N.; 70 50 45 W..	1,537	36.9	gy. oz.......	Rare.
10100	U.S.N.M.	1	D2228...	37 25 00 N.; 73 06 00 W..	1,582	36.8	br. m.......	Rare.
10101	U.S.N.M.	1	D2381...	28 05 00 N.; 87 56 15 W..	1,330	....	lt. br. m.....	Rare.
10102	U.S.N.M.	1	D2385...	28 51 00 N.; 88 18 00 W..	730	40.1	gy. m.......	Rare.
10103	U.S.N.M.	4	D2550...	39 44 30 N.; 70 30 45 W..	1,081	38.5	br. m.......	Few.
10104	U.S.N.M.	2	D2562...	39 15 30 N.; 71 25 00 W..	1,434	37.3	gy. oz.......	Rare.
10105	U.S.N.M.	1	D2677...	32 39 00 N.; 76 50 30 W..	478	39.3	gn. m.......	Rare.

REOPHAX NODULOSUS H. B. Brady.

Plate 5, figs. 2, 3.

Reophax nodulosus H. B. BRADY, Quart. Journ. Micr. Sci., vol. 19, 1879, p. 52, pl. 4, figs. 7, 8; Denkschr. Akad. Wiss. Wien, vol. 42, 1881, p. 99; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 294, pl. 31, figs. 1-9.—TOUTKOWSKI, Zap. Kievsk. obshch. Est., vol. 9, 1888, p. 5, pl. 2, figs. 2*a*, *b*.—EGGER, Abh. Bay. Akad. Wiss. München, vol. 18, 1893, p. 256, pl. 4, figs. 5-7, 12, 13 (?).—GOËS, Köngl. Svensk. Vet. Akad. Handl., vol. 25, No. 9, 1894, p. 26, pl. 6, figs. 187-191.—CHAPMAN, Proc. Zool. Soc. London, 1895, p. 15.—GOËS, Bull. Mus. Comp. Zoöl., vol. 29, 1896, p. 27.—FLINT, Rep. U. S. Nat. Mus., 1897 (1899), p. 274, pl. 18, fig. 4.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 87, fig. 122.—PEARCEY, Trans. Roy. Soc. Edinburgh, vol. 49, 1914, p. 1006.

Description.—Test elongate, tapering, straight or slightly curved, composed of several (up to 20) chambers, but usually less than 12, pyriform in shape, widest near the basal end and thence tapering toward the apertural end, chambers gradually increasing in length and diameter as added, wall in short chambered specimens rough, in those with elongate chambers usually neatly finished on the exterior, composed of sand grains with a reddish-brown cement; aperture fairly large, circular; color reddish or yellowish brown.

Length up to 25 mm.

Distribution.—From the available records this species is very widely distributed. In the published figures there is a wide range of form shown. From the *Albatross* material it has not been abundant except at a few stations in the Gulf of Mexico, but there are scattered specimens from other stations. From this material it seems worthy of note that different areas show rather constant differences in form and size. The very large specimens figured by Brady were obtained by the *Challenger* near the Antarctic ice barrier, and it is noteworthy that Pearcey also found specimens over an inch in length in the Antarctic material of the *Scotia*.

Although reaching such a splendid development in the Antarctic, there is no such corresponding development in the Arctic, where it is not even given as a characteristic species by Awerinzew or in other lists from this region, although mentioned by Brady as occurring off Franz Josef Land. Even in the comparatively meager material I have had there seems to be at least three distinct forms, with an indicated corresponding distribution. Except in the Gulf of Mexico and at one or two other stations, specimens are not abundant enough for a definite working out of the problem at the present time. In the deep water of the Philippine region from which I have had considerable material the form of the species is entirely different from that of the Atlantic and of the western Pacific, and altogether it is strongly indicated that there are several varieties and perhaps species included under this name.

These forms all agree in one important detail, that of the form of the apertural end of the chambers, which are tapering with straight sides and the end broadly truncate, giving a large aperture. The figures given by Goës show an entirely different form and I do not think belong to this species, even in a broad sense. Egger's figures are very greatly lacking in character, but none of them represent anything that seems to me to belong here.

Reophax nodulosus—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
10117	U.S.N.M.	1	D2035...	39 26 16 N.; 70 02 37 W..	1,362	....	glob. oz.....	Rare.
10118	U.S.N.M.	1	D2072...	41 53 00 N.; 65 35 00 W..	858	39	gy. m.......	Rare.
10523	U.S.N.M.	1	D2140...	17 36 10 N.; 76 46 05 W..	966	39.7	s............	Rare.
10119	U.S.N.M.	1	D2383...	28 32 00 N.; 88 06 00 W..	1,181	39.8	br. gn. m....	Rare.
10120	U.S.N.M.	6	D2385...	28 51 00 N.; 88 18 00 W..	730	40.1	gy. m.......	Few.
10121	U.S.N.M.	1	D2393...	28 43 00 N.; 87 14 30 W..	525	41.1	lt. gy. m....	Rare.
10122	U.S.N.M.	1	D2505...	44 23 30 N.; 61 44 15 W..	93	42.3	dk. br. m...	Rare.
10123	U.S.N.M.	1	D2542...	40 00 15 N.; 70 42 20 W..	129	47.2	s. brk. sh....	Rare.
10124	U.S.N.M.	10+	D2568...	39 15 00 N.; 68 08 00 W..	1,781	36.9	gy. oz.......	Common.
10125	U.S.N.M.	1	H82.....	13 29 00 N.; 62 42 40 W..	1,051	....	for.m. bk. sp.	Rare.
10126	U.S.N.M.	1	H86.....	12 58 40 N.; 62 48 00 W..	1,635	....	bu. m. for. bk. sp.	Rare.
10145	U.S.N.M.	1	H88.....	12 29 00 N.; 62 38 30 W..	1,630	....	m. bk. sp. for	Rare.

REOPHAX DENTALINIFORMIS H. B. Brady.

Plate 5, figs. 4, 5.

Reophax dentaliniformis H. B. BRADY, Quart. Journ. Micr. Sci., vol. 21, 1881, p. 49; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 293, pl. 30, figs. 21, 22.—GOËS, Köngl. Svensk. Vet. Akad. Handl., vol. 25, No. 9, 1894, p. 25, pl. 6, figs. 172–175.—SCHLUMBERGER, Mem. Soc. Zool. France, vol. 7, 1894, p. 239.—CHAPMAN, Proc. Zool. Soc. London, 1895, p. 15.—GOËS, Bull. Mus. Comp. Zoöl., vol. 29, 1896, p. 27.—FLINT, Rep. U. S. Nat. Mus., 1897 (1899), p. 274, pl. 18, fig. 2.—MILLETT, Journ. Roy. Micr. Soc., 1899, p. 254.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 87, fig. 121.—AWERINZEW, Mem. Acad. Imp. Sci. St. Petersbourg, ser. 8, vol. 29, No. 3, 1911, p. 15.—RHUMBLER, Foram. Plankton Exped., teil 1, 1911, pl. 8, figs. 21, 22; teil 2, 1913, p. 473.—PEARCEY, Trans. Roy. Soc. Edinburgh, vol. 49, 1914, p. 1006.—CHAPMAN, Zool. Results "Endeavour," vol. 1, pt. 3, 1915, p. 310.

Reophax nodulosa BAGG (not H. B. Brady), Proc. U. S. Nat. Mus., vol. 34, 1908, p. 23.

Description.—Test slender, tapering, composed of a few (5–6) chambers, increasing progressively in length as added, slightly tumid in the middle, contracted slightly at the ends; arranged in a straight or slightly curved line; wall of rather coarse sand grains but cemented to give a smooth even surface. apertural end tapering rather abruptly to a short cylindrical neck; aperture circular, color gray.

Length up to 2 mm.

Distribution.—This is a species of wide distribution unless as may be suspected more than one species has been included under this name. I have tried to restrict it to those rather small and delicate specimens with the tapering form and elongate last chamber figured by Brady. In the *Albatross* dredgings such specimens have occurred at numerous stations along the eastern coast of the United States, a few in the Gulf of Mexico, and one off Brazil. The published records give its occurrence in the Arctic and Antarctic, off Australia, the Arabian Sea, the Malay region and the Sea of Okhotsk as well as other regions. If all these are typical it certainly has a very wide distribution. Unfortunately no figures are given in a majority of these cases and descriptive notes are usually wanting.

Reophax dentaliniformis—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°*F.*		
10147	U.S.N.M.	10+	D2003	37 16 30 N.; 74 20 36 W.	641			Common.
10148	U.S.N.M.	1	D2018	37 12 22 N.; 74 20 04 W.	788	39	bu. m.	Rare.
10149	U.S.N.M.	1	D2034	39 27 10 N.; 69 56 20 W.	1,346	38	glob. oz.	Rare.
10150	U.S.N.M.	2	D2039	38 19 26 N.; 68 20 20 W.	2,369		glob. oz.	Rare.
10151	U.S.N.M.	1	D2041	39 22 50 N.; 68 25 00 W.	1,608	38	glob. oz.	Rare.
10152	U.S.N.M.	1	D2043	39 49 00 N.; 68 28 30 W.	1,467	38.5	glob. oz.	Rare.
10153	U.S.N.M.	1	D2072	41 53 00 N.; 65 35 00 W.	858	39	gy. m.	Rare.
10154	U.S.N.M.	1	D2073	41 54 15 N.; 65 39 00 W.	586.5	40	gy. s.	Rare.
10155	U.S.N.M.	1	D2076	41 13 00 N.; 66 00 50 W.	906		bu. m.	Rare.
10156	U.S.N.M.	2	D2097	37 56 20 N.; 70 57 30 W.	1,917		glob. oz.	Rare.
10157	U.S.N.M.	4	D2111	35 09 50 N.; 74 57 40 W.	938		gn. m.	Few.
10158	U.S.N.M.	1	D2115	35 49 30 N.; 74 34 45 W.	843	39	m. fne. s.	Rare.
10159	U.S.N.M.	4	D2160	23 10 31 N.; 82 20 37 W.	167		co.	Few.
10160	U.S.N.M.	9	D2189	39 49 30 N.; 70 26 00 W.	600	39.7	gn. m. s.	Common.
10161	U.S.M.N.	10+	D2202	39 38 00 N.; 71 39 45 W.	515	39.1	gn. m.	Common.
10162	U.S.N.M.	9	D2204	39 30 30 N.; 71 44 30 W.	728	39.1	br. m.	Common.
10163	U.S.N.M.	7	D2212	39 59 30 N.; 70 30 45 W.	428	40	gn. m.	Common.
10164	U.S.N.M.	1	D2231	38 29 00 N.; 73 09 00 W.	965	36.8	gy. oz.	Rare.
10165	U.S.N.M.	3	D2240	40 27 30 N.; 70 29 00 W.	44		gn. m.	Few.
10166	U.S.N.M.	3	D2242	40 15 30 N.; 70 27 00 W.	58	51.4	gn. m.	Few.
10167	U.S.N.M.	4	D2243	40 10 15 N.; 70 26 00 W.	63	52.4	gn. m.	Few.
10168	U.S.N.M.	10+	D2262	39 54 45 N.; 69 29 45 W.	250	41.6	gn. m. s.	Common.
10169	U.S.N.M.	10+	D2377	27 07 30 N.; 88 08 00 W.	210	67	gy. m.	Common.
10170	U.S.N.M.	1	D2392	28 47 30 N.; 87 27 00 W.	724	40.7	br. gy. m.	Rare.
10171	U.S.N.M.	1	D2528	41 47 00 N.; 65 37 30 W.	677	38.7	br. s.	Rare.
10172	U.S.N.M.	10+	D2530	40 53 30 N.; 66 24 00 W.	956	38.4	gy. oz.	Common.
10173	U.S.N.M.	4	D2531	40 42 00 N.; 66 33 00 W.	852	38.4	gy. m.	Few.
10174	U.S.N.M.	10+	D2550	39 44 30 N.; 70 30 45 W.	1,081	38.5	br. m.	Common.
10175	U.S.N.M.	3	D2562	39 15 30 N.; 71 25 00 W.	1,434	37.3	gy. oz.	Few.
10176	U.S.N.M.	10+	D2581	39 43 00 N.; 71 34 00 W.	394		gn. m.	Common.
10177	U.S.N.M.	10+	D2677	32 39 00 N.; 76 50 30 W.	478	39.3	gn. m.	Common.
10178	U.S.N.M.	9	D2679	32 40 00 N.; 76 40 30 W.	782	38.6	lt. gy. oz.	Common.
10179	U.S.N.M.	1	D2689	39 42 00 N.; 71 15 30 W.	525		gn. m.	Rare.
10180	U.S.N.M.	4	D2710	40 06 00 N.; 68 01 30 W.	984		gn. m.	Few.
10181	U.S.N.M.	1	D2748	39 31 00 N.; 71 14 30 W.	1,163	37.8	gy. m. for.	Rare.
10182	U.S.N.M.	2	D2761	15 39 00 S.; 38 32 54 W.	818	39	pter. oz.	Rare.

REOPHAX BACILLARIS H. B. Brady.

Plate 5, fig. 6.

Reophax bacillaris H. B. Brady, Quart. Journ. Micr. Sci., vol. 21, 1881, p. 49; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 293, pl. 30, figs. 23, 24.—Egger, Abh. Bay. Akad. Wiss. München, vol. 18, 1893, p. 257, pl. 4, fig. 33.—de Amicis, Nat. Sic., anno. 14, 1895, p. 72, pl. 1, fig. 17.—Chapman, Proc. Zool. Soc. London, 1895, p. 15.—Goës, Bull. Mus. Comp. Zoöl., vol. 29, 1896, p. 27.—Flint, Rep. U. S. Nat. Mus., 1897 (1899), p. 274, pl. 18, fig. 3.—Millett, Journ. Roy. Micr. Soc., 1899, p. 254, pl. 4, fig. 12.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 86, fig. 120.

Description.—Test elongate, regularly tapering, in the megalospheric form straight, in the microspheric form usually with a decided angle in the earlier portion, composed of a large number (sometimes as many as thirty) short chambers, earlier ones, especially in the microspheric form close and indistinct, later ones distinct with constrictions between and the sides rounded, increasing somewhat in length toward the apertural end, wall of fine sand grains of even texture, roughened on the exterior; color gray.

Length of microspheric adults 5–6 mm., of megalospheric 2–3 mm.

Distribution.—The distribution of *Reophax bacillaris* seems to be very definite. The *Challenger* Report described and figured it from *Valarous* station 8, southwest of Greenland, latitude 59° 10′ N.; longitude 50° 25′ W., 1,750 fathoms (3,200 meters), and mentioned "some broken tests belonging to the same species" from the *Porcupine* dredgings south of Rockall Bank, 420 fathoms (768 meters). It was also recorded from 1,070 fathoms (1,957 meters) on the north coast of New Guinea, but Brady mentions that the material except from the first station is "inferior in point of size and distinctiveness." The only other *Challenger* record is station 44, latitude 37° 25′ N.; longitude 71° 40′ W., 1,700 fathoms (3,109 meters), bottom temperature 36.2° F. (2.3° C.). This is almost in the center of distribution shown by the *Albatross* material.

With the four stations given by Flint, *Challenger* station 44 and eighteen stations at which I have found the species there is a definite area off our coast in which the species occurred, latitude 37°–40° N.; and longitude 68°–73° W., in which the species at certain stations may be called abundant. The only other material I have is a specimen very similar from *Albatross* station D2750 off the Leeward Islands.

Egger records the species from the west coast of Africa and an examination of his material is necessary to determine whether it is the same or not.

The material from the area in which it is so common is very well characterized indeed and marked by both microspheric and megalospheric forms. The microspheric is very tapering and has a characteristic change of direction before the last series of chambers is added. The megalospheric form is a straight or slightly curved test with the chambers fairly distinct from the beginning. The early chambers are larger than those immediately succeding and the appearance from the exterior is that of a *Clavulina*. The three larger specimens in Flint's figure are microspheric, the other a megalospheric specimen. In size, shape, number of chambers, color, and the whole ensemble of characters is very definite, making a well-defined species.

Millett's figured specimen from the Malay Archipelago, while suggesting this species in its tapering shape, is different in the form of the chambers and especially in the aperture. I doubt very much if this Malay form is identical with the well-characterized Atlantic species. Chapman records it from the Arabian Sea, but this again is a case where a reëxamination of the material is desirable and a comparison with the clear-cut characters as here shown.

Reophax bacillaris—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″				
10206	U.S.N.M.	10+	D2035...	39 26 16 N.; 70 02 37 W..	1,362	....	glob. oz.....	Common.
10207	U.S.N.M.	4	D2037...	38 53 00 N.; 69 23 30 W..	1,731	38	glob. oz.....	Few.
10208	U.S.N.M.	10+	D2038...	38 30 30 N.; 69 08 35 W..	2,033	....	glob. oz.....	Common.
10209	U.S.N.M.	10+	D2039...	38 19 26 N.; 68 20 20 W..	2,369	....	glob. oz.....	Common.
10210	U.S.N.M.	10+	D2041...	39 22 50 N.; 68 25 00 W..	1,608	38	glob. oz.....	Common.
10211	U.S.N.M.	8	D2042...	39 33 00 N.; 68 26 45 W..	1,555	38.5	glob. oz.....	Common.
10212	U.S.N.M.	10+	D2043...	39 49 00 N.; 68 28 30 W..	1,467	38.5	glob. oz.....	Common.
10213	U.S.N.M.	1	D2046...	40 02 49 N.; 68 49 00 W..	407	40	bu. m.......	Rare.
10214	U.S.N.M.	5	D2097...	37 56 20 N.; 70 57 30 W..	1,917	....	glob. oz.....	Few.
10215	U.S.N.M.	10+	D2105...	37 50 00 N.; 73 03 50 W..	1,395	41	glob. oz.....	Common.
10216	U.S.N.M.	9	D2174...	38 15 00 N.; 72 03 00 W..	1,594	....	gy. m........	Common.
10217	U.S.N.M.	10+	D2221...	39 05 30 N.; 70 44 30 W..	1,525	36.9	gy. oz........	Common.
10218	U.S.N.M.	6	D2226...	37 00 00 N.; 71 54 00 W..	2,045	36.8	glob. oz.....	Few.
10219	U.S.N.M.	6	D2228...	37 25 00 N.; 73 06 00 W..	1,582	36.8	br. m........	Few.
10522	U.S.N.M.	5	D2229...	37 38 40 N.; 73 16 30 W..	1,423	37.7	glob. oz.....	Few.
10221	U.S.N.M.	6	D2562...	39 15 30 N.; 71 25 00 W..	1,434	37.3	gy. oz........	Few.
10222	U.S.N.M.	1	D2564...	39 22 00 N.; 71 23 30 W..	1,390	37.3	gy. oz........	Rare.
10223	U.S.N.M.	1	D2714...	38 22 00 N.; 70 17 30 W..	1,825	....	br. oz........	Rare.
10224	U.S.N.M.	1	D2750...	18 30 00 N.; 63 31 00 W..	496	44.5	fne. gy. s....	Rare.

REOPHAX MEMBRANACEUS H. B. Brady.

Reophax membranaceus H. B. Brady. Quart. Journ. Micr. Sci., vol. 19, 1879, p. 53, pl. 4, fig. 9; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 297, pl. 32, figs. 1–4.—Millett, Journ. Roy. Micr. Soc., 1899, p. 255, pl. 4, fig. 14.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 90, fig. 126.—Pearcey, Trans. Roy. Soc. Edinburgh, vol. 49, 1914, p. 1006.

Description.—Test small, elongate, slender, slightly curved or straight, composed of several chambers, broadest near the central portion and tapering toward the ends, sutures distinct; wall thin, chitinous, with fine sand particles, often wrinkled transversely; aperture small, circular, at the end of the somewhat truncate neck; color a yellowish or reddish brown.

Length up to 1.4 mm.

Distribution.—In the Atlantic *Challenger* material this species is recorded from off Palma, Canary Islands, in 1,125 fathoms (2,057 meters), and east of Buenos Aires in 1,900 fathoms (3,475 meters). It also occurs in deep water in the Pacific. Pearcey notes it from the Antarctic in 1,775 fathoms (3,246 meters) as rare.

Millett's material from the Malay Archipelago does not seem to be identical with the species figured by Brady and that which I have seen from the Pacific.

R. membranaceus is evidently a species of deep cold water and is either rare or overlooked on account of its small size.

Neither Flint nor I have found it in the *Albatross* material from the Atlantic coast, but this might be expected, for most of the material is not really abyssal in its character, whereas most of the records for this species are from such habitats.

REOPHAX MONILIFORME Siddall.

Reophax (?) sp. Balkwill and Wright, Trans. Roy. Irish Acad., vol. 28, (Sci.), 1885, p. 328, pl. 13, figs. 9, 22–24.—Halkyard, Trans. Ann. Rep. Manchester Micr. Soc., 1889, p. 66, pl. 1, figs. 8–9.

Reophax moniliforme Siddall, Proc. Lit. Philos. Soc. Liverpool, No. 40, 1886, appendix, p. 54, pl. 1, fig. 2.—Heron-Allen and Earland, Journ. Roy. Micr. Soc., 1909, p. 322; Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 43, pl. 2, fig. 12; Trans. Linn. Soc. London, vol. 11, pt. 13, 1916, p. 223.

Description.—Test elongate, subcylindrical, slightly tapering, initial end of the test largest, thence gradually decreasing in diameter to the apertural end or keeping the same diameter throughout after the early portion, in some cases the proloculum large and inflated; wall of fine sand and cement or largely of sponge spicules laid lengthwise of the test; color ferruginous.

Distribution.—This species is only known from the region of the British Isles. It is found especially at several stations in the Clare Island region, western Ireland, and off western Scotland (Heron-Allen and Earland).

One of the peculiar characters of the species is the tendency to break, leaving the apertural end and a few adjacent chambers only. Heron-Allen and Earland, however, have found complete specimens in the Clare Island region. It has not been found on the western side of the Atlantic.

REOPHAX FINDENS (Parker).

Lituola findens Parker, in Dawson, Canad. Nat., vol. 5, 1870, pp. 177, 180, fig. 1.—Siddall, Proc. Chester Soc. Nat. Sci., pt. 2, 1878, p. 47.

Reophax findens Siddall, Catal. British Rec. Foram., 1879, p. 4.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 299, pl. 32, figs. 10–11.—Egger, Abh. Bay. Akad. Wiss. München, vol. 18, 1893, p. 257, pl. 4, figs. 28–30.—Heron-Allen and Earland, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 44, pl. 2, fig. 13.—Rhumbler, Foram. Plankton Exped., teil 2, 1913, p. 466, fig. 175.

Description.—Test elongate, one end bifurcate, the other single, chambers of nearly uniform size, aperture at the single end, rounded or elliptical; wall arenaceous, somewhat rough; reddish brown in color.

Length about 1 mm.

Distribution.—The type locality for this species is Gaspe Bay, Gulf of St. Lawrence, in 15–20 fathoms (27-37 meters). The other records are from about the British Isles, the estuary of the Dee (Siddall), and six stations in the Clare Island region on the west coast of Ireland (Heron-Allen and Earland).

This species has been confused with *R. moniliforme*, which, according to Heron-Allen and Earland differs in being smoother than *R. findens* and in using sponge spicules which *R. findens* does not use. The shape when complete is, of course, distinctive.

I have entirely failed to find this species in the Atlantic material which I have examined.

REOPHAX SPICULIFER H. B. Brady.

Reophax spiculifer H. B. BRADY, Quart. Journ. Micr. Sci., vol. 19, 1879, p. 54, pl. 4, figs. 10, 11; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 295, pl. 31, figs. 16, 17.—EGGER, Abh. Bay. Akad. Wiss. München, vol. 18, 1893, p. 258, pl. 4, fig. 19 (?).—CHAPMAN, Proc. Zool. Soc. London, 1895, p. 14.—CUSHMAN, Bull. 71, U.S.Nat. Mus., pt. 1, 1910, p. 92, figs. 132–133.—CHAPMAN, Rept. Sci. Invest., British Antarctic Exped., Geol., vol. 2, pt. 3, 1918, p. 62, pl. 3, fig. 16.—CUSHMAN, Proc. U. S. Nat. Mus., vol. 56, 1919, p. 598.

Description.—Test composed of a few chambers, each broadest at the posterior end and gradually narrowing toward the apertural end, wall thin, composed of a single layer of elongate sponge spicules, placed side by side and lengthwise of the chamber, often projecting backward beyond the posterior end of the chamber; aperture circular.

Length about 1 mm.

Distribution.—The only Atlantic records for this species are off Sombrero Island, West Indies, 450 fathoms (823 meters). It is known from the Pacific off Tahiti, 620 fathoms (1,134 meters); off Kandavu, 255 (466 meters) and 610 (1,116 meters) fathoms; off the Hawaiian Islands, 2,350 fathoms (4,298 meters); and in the Southern Ocean, from off Kerguelen Island, 20–120 fathoms (37–219 meters); and from Ross Sea, 460–655 fathoms (841–1,198 meters). It is rare at all the stations according to report.

It is one of those species which has selective power of taking sponge spicules from the other constituents of the bottom on which it lives.

REOPHAX ARMATUS Goës.

Reophax armatus GOËS, Bull. Mus. Comp. Zoöl., vol. 29, 1896, p. 29, pl. 1, fig. 1.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 91, fig. 128.

Description.—"The growth of the test is nearly the same as that of *R. distans*, but the segments are provided with 3–6 more or less produced spines or tubes; sometimes it seems as if some of those tubes were in connection with side chambers, so that a construction somewhat like a *Ramulina* is originated. Shell wall thin, light brown, built up by finest sand and sponge spicules, often partly covered with white dust; the surface is often sparingly prickly by sponge needles. The scarcity of the supply has not allowed a closer examination and analysis of this peculiar form."

Distribution.—The record of this species for the Caribbean is *Albatross* H2352, latitude, 22° 35′ N.; longitude 84° 23′ W., off the southwestern coast of Cuba, depth 463 fathoms (847 meters). It was evidently very rare, as noted by Goës.

Millett has suggested[1] that this species of Goës may in reality be a species of *Aschemonella* and perhaps identical with Brady's original *A. catenata*. The character of lateral tubular projections resembles *Aschemonella*. There is no material available that will settle what this form really is.

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[1] Journ. Roy. Micr. Soc., 1899, p. 252.

REOPHAX HISPIDULUS, new species.

Plate 5, fig. 7.

Description.—Test elongate, composed of pyriform, flask-shaped chambers, widest at the broadly rounded, somewhat truncate base, apertural end extended, gradually tapering to a slender cylindrical neck; wall composed of fine amorphous material with a large amount of fine sponge spicules, for the most part irregularly arranged, but toward the base of the chamber extending directly backward, especially about the periphery; aperture a small circular opening at the end of a long slender cylindrical neck; color light gray.

Length 3 mm. or more.

Distribution.—Type specimen (U.S.N.M. No. 10670) from D2677 off the southeastern Atlantic coast of the United States, latitude, 32° 39′ N.; longitude 76° 50′ 30″ W., in 478 fathoms, (873 meters) bottom temperature 39.3° F. (3.9°C.)

This seems to be distinct from other spicular forms of the genus. The fine amorphous material with the fine spicules is not unlike the texture of *Crithionina pisum* Goës, var. *hispida* Flint.

REOPHAX CYLINDRICUS H. B. Brady.

Plate 5, fig. 8.

Reophax cylindricus H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 299, pl. 32, figs. 7–9.—Egger, Abh. Bay. Akad. Wiss. München, vol. 18, 1893, p. 257, pl. 4, fig. 37 (?).—Flint, Rep. U. S. Nat. Mus., 1897 (1899), p. 274, pl. 18, fig. 6.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 91, figs. 129–131.

Description.—Test elongate, subcylindrical, slightly tapering, the last-formed chamber being of the greatest width, initial end broadly rounded, apertural end tapering with a very short truncate neck and rounded aperture; wall of fine sand grains of uniform size, neatly and firmly cemented, the outer wall smooth; color a yellowish or reddish brown slightly banded, chambers hardly distinguishable from the exterior except by differences in color or by slight constrictions, in section separated by very thick transverse walls.

Length up to 5 mm.

Distribution.—The type specimens of this species were from a station of the *Valorous* southwest of Greenland, latitude 59° 10′ N.; longitude 50° 25′ W., in 1,750 fathoms (3,200 meters). Flint had a single specimen from *Albatross* station D2568 in 1,781 fathoms (3,274 meters) off the northeastern coast of the United States. I have specimens, very typical in character from five stations nearby as noted in the list. It never seems to be common but holds its characters most fixedly.

The one Pacific record has a question mark in the *Challenger* work and but a fragment was recorded in the Southern Ocean. Egger's record for the west coast of Africa I can not affirm, not having seen his material. The type locality with the six closely adjacent stations off our own coast certainly have the species in typical form and I have examined material from hundreds of stations southward without finding it, nor did I find it from the many Pacific stations examined.

It would seem then that we have here a very well marked species with constant characters and a comparatively limited distribution.

Reophax cylindricus—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
10127	U.S.N.M.	1	D2038...	38 30 30 N.; 69 08 35 W..	2,033	....	glob. oz.....	Rare.
10128	U.S.N.M.	3	D2042...	39 33 00 N.; 68 26 45 W..	1,555	38.5	glob. oz.....	Rare.
10129	U.S.N.M.	3	D2041...	39 22 50 N.; 68 25 00 W..	1,608	38	glob. oz.....	Rare.
10130	U.S.N.M.	1	D2222...	39 03 15 N.; 70 50 45 W..	1,537	36.9	gy. oz.......	Rare.
10131	U.S.N.M.	1	D2562 ..	39 15 30 N.; 71 25 00 W..	1,434	37.3	gy. oz.......	Rare.

REOPHAX SABULOSUS H. B. Brady.

Reophax rudis H. B. BRADY, Quart. Journ. Micr. Sci., vol. 21, 1881, p. 49.—CARPENTER, The Microscope, ed. 6, 1881, p. 563, figs. *a*, *b*.

Reophax sabulosa H. B. BRADY, Proc. Roy. Soc. Edinburgh, vol. 11, 1882, p. 715; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 298, pl. 32, figs. 5, 6.—[?]GOËS, Köngl. Svensk. Vet. Akad. Handl., vol. 25, No. 9, 1894, p. 27, pl. 6, figs. 199-202.

Description.—"Test elongate, cylindrical, slightly tapering, sides even and unconstricted, extremities rounded. Walls thick, composed of rather fine gray sand only partially cemented, and showing no external marks of segmentation. The longitudinal section reveals about six segments, each tapering at the summit to a stoloniferous tube, the mouth of which, as well as the external aperture of the test, is stained reddish brown."

"Length, 4/10th inch (10 mm.) or more."

Distribution.—The type specimens came from the cold area of the Faroe Channel and a second dredging in the same area later gave additional specimens, depths 530 and 540 fathoms (969 and 988 meters).

The specimens figured by Goës under this name do not agree in shape, in wall characters or chamber divisions with the type figures and apparently represent something else. The specimens referred to this species from the Caribbean by Goës[1] are labeled by Goës as *R. ammophila* Goës in his collection returned to the United States National Museum and do not seem to be *R. sabulosus* H. B. Brady.

Evidently *R. sabulosus* is a species peculiar to the general region of the Faroe Channel, as are other species now known nowhere else.

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[1] Bull. Mus. Comp. Zoöl., vol. 29, 1896, p. 28.

Such a striking species would unlikely be overlooked elsewhere and may rank with *Botellina labyrinthica*, *Technitella thompsoni*, *Psammosphaera rustica*, and others as species which so far as we have data are confined to this general region.

Its nearly related form seems to be *R. cylindricus*.

Genus HORMOSINA H. B. Brady, 1879.

Hormosina H. B. BRADY (type, *H. globulifera* H. B. Brady), Quart. Journ. Micr. Sci., vol. 19, 1879, p. 56.—BÜTSCHLI, in Bronn, Klassen und Ordnungen des Thierreichs, vol. 1, 1880, p. 199.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 325.—CHAPMAN, The Foraminifera, 1902, p. 149.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 93.

Description.—Test free, composed of a linear series of subglobular, fusiform, or pyriform chambers joined end to end in a single moniliform series, straight, somewhat curved or irregular; walls usually thin, finely arenaceous with an excess of cement, chambers undivided; aperture a single circular opening usually at the dorsal end of the last-formed chamber, often with a neck, but occasionally at the side of the chamber; color yellowish or reddish brown.

This genus differs from *Reophax* mainly in its finer texture, smooth surface and reddish brown or yellowish color, all due to the excessive amount of cement and fine particles of which the test is composed.

As a rule the genus seems to be characteristic of rather deep water.

HORMOSINA GLOBULIFERA H. B. Brady.

Plate 6, fig. 1.

Hormosina globulifera H. B. BRADY, Quart. Journ. Micr. Sci., vol. 19, 1879, p. 60, pl. 4, figs. 4, 5.—W. B. CARPENTER, The Microscope, 6th ed., 1881, p. 563, fig. 320*c* (in text).—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 326, pl. 39, figs. 1–6.—DE FOLIN, Le Naturaliste, vol. 10, 1888, p. 87, figs. 1, 2.—J. WRIGHT, Proc. Roy. Irish Acad., vol. 1, 1891, p. 468.—CHAPMAN, Journ. Roy. Micr. Soc., 1892, p. 326, pl. 6, figs. 10*a*, *b*.—GOËS, Köngl. Svensk. Vet. Akad. Handl., vol. 25, No. 9, 1894, p. 29, pl. 6, figs. 218, 219.—CHAPMAN, Proc. Zool. Soc. London, 1895, p. 17.—GOËS, Bull. Mus. Comp. Zoöl., vol. 29, 1896, p. 34.—FLINT, Rep. U. S. Nat. Mus., 1897 (1899), p. 280, pl. 24, fig. 4.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 93, figs. 136–137.—PEARCEY, Trans. Roy. Soc. Edinburgh, vol. 49, 1914, p. 1007.—HERON-ALLEN and EARLAND, Trans. Zool. Soc. London, vol. 20, 1915, p. 617, pl. 46, fig. 25.

Description.—Test typically composed of a few nearly spherical chambers, each much larger than its predecessor and slightly embracing it proximally, sutures very distinct, chambers in a simple straight or slightly curved line; wall composed of fine arenaceous material with an excess of reddish or yellowish brown cement, surface smoothly finished both within and without, comparatively thin; aperture small, circular, at the end of a short tubular neck.

Length up to nearly 5 mm.

Distribution.—From all the available specimens and records this is a widely distributed species but occurs most abundantly, as far as the material I have examined shows, in cool waters, being best developed in the cold water off the northeastern coast of the United States. It does not appear to be common either in the Arctic or Antarctic. It is more characteristic of deep waters, nearly all stations at which it was really abundant being over 1,500 fathoms (2,743 meters) with the greatest development around 2,000 fathoms (3,658 meters).

Both microspheric and megalospheric specimens evidently occur. In the former the proloculum is very small and the number of chambers reaches the maximum, five to six. In the megalospheric specimens the proloculum is large and the number of chambers is from one to three. In the extreme cases where a single chamber is produced it is as large as the final chamber in the adult of three chambered specimens. This accords with what Schlumberger showed in the development of various species of *Biloculina*.

Outside this character of developmental stages there is little variation in the species except perhaps in the fineness of the material of the chamber walls and the relative amount of the cement used in the wall. Altogether it is a very constant and satisfactory species.

Hormosina globulifera—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
			Albatross.	° ′ ″ ° ′ ″		°*F*		
10054	U.S.N.M.	8	D2003...	37 16 30 N.; 74 20 36 W..	641	....	....	Few.
10051	U.S.N.M.	5	D2018...	37 12 22 N.; 74 20 04 W..	788	39	bu. m........	Few.
10053	U.S.N.M.	10+	D2035...	39 26 16 N.; 70 02 37 W..	1,362	....	glob. oz......	Common.
10265	U.S.N.M.	6	D2036...	38 52 40 N.; 69 24 40 W..	1,735	38	glob. oz......	Few.
10003	U.S.N.M.	10+	D2037...	38 53 00 N.; 69 23 30 W..	1,731	38	glob. oz......	Common.
10004	U.S.N.M.	10+	D2038...	38 30 30 N.; 69 08 25 W..	2,033	....	glob. oz......	Common.
10005	U.S.N.M.	10+	D2039...	38 19 26 N.; 68 20 20 W..	2,369	....	glob. oz......	Common.
10055	U.S.N.M.	2	D2041...	39 22 50 N.; 68 25 00 W..	1,608	38	glob. oz......	Rare.
10006	U.S.N.M.	9	D2042...	39 33 00 N.; 68 26 45 W..	1,555	38.5	glob. oz......	Common.
10007	U.S.N.M.	10+	D2043...	39 49 00 N.; 68 28 30 W..	1,467	38.5	glob. oz......	Common.
10056	U.S.N.M.	5	D2052...	39 40 05 N.; 69 21 25 W..	1,098	45	glob. oz......	Few.
10008	U.S.N.M.	4	D2072...	41 53 00 N.; 65 35 00 W..	858	39	gy. m........	Few.
10037	U.S.N.M.	1	D2089...	39 58 50 N.; 70 39 40 W..	168	45	gy. s.........	Rare.
10057	U.S.N.M.	1	D2096...	39 22 20 N.; 70 52 20 W..	1,451	37.5	glob. oz......	Rare.
10058	U.S.N.M.	10+	D2097...	37 56 20 N.; 70 57 30 W..	1,917	....	glob. oz......	Common.
10009	U.S.N.M.	2	D2105...	37 50 00 N.; 73 03 50 W..	1,395	41	glob. oz......	Rare.
10010	U.S.N.M.	2	D2111...	35 09 50 N.; 74 57 40 W..	938	....	gn. m........	Rare.
10011	U.S.N.M.	1	D2115...	35 49 30 N.; 74 34 45 W..	843	39	m., fne. s....	Rare.
10059	U.S.N.M.	1	D2140...	17 36 10 N.; 76 46 05 W..	966	39.7	s.............	Rare.
10012	U.S.N.M.	3	D2160...	23 10 31 N.; 82 20 37 W..	167	....	co............	Rare.
10013	U.S.N.M.	3	D2171...	37 59 30 N.; 73 48 40 W..	444	39.5	gn. m........	Rare.
10014	U.S.N.M.	10+	D2174...	38 15 00 N.; 72 03 00 W..	1,594	....	gy. m........	Common.
10015	U.S.N.M.	1	D2189...	39 49 30 N.; 70 26 00 W..	600	39.7	gn. m. s......	Rare.
10016	U.S.N.M.	3	D2192...	39 46 30 N.; 70 14 45 W..	1,060	38.6	gy. oz........	Few.
10052	U.S.N.M.	6	D2202...	39 38 00 N.; 71 39 45 W..	515	39.1	gn. m........	Few.
10017	U.S.N.M.	6	D2203...	39 34 15 N.; 71 41 15 W..	705	38.9	gn. m. s......	Few.
10018	U.S.N.M.	3	D2204...	39 30 30 N.; 71 44 30 W..	728	39.1	br. m........	Rare.
10019	U.S.N.M.	3	D2208...	39 33 00 N.; 71 16 15 W..	1,178	38.4	gn. m........	Rare.
10020	U.S.N.M.	2	D2212...	39 59 30 N.; 70 30 45 W..	428	40	gn. m........	Rare.
10021	U.S.N.M.	1	D2217...	39 47 20 N.; 69 34 15 W..	924	38.1	gy. m........	Rare.
10022	U.S.N.M.	10+	D2221...	39 05 30 N.; 70 44 30 W..	1,525	36.9	gy. oz........	Common.
10060	U.S.N.M.	9	D2222...	39 03 15 N.; 70 50 45 W..	1,537	36.9	gy. oz........	Common.
10023	U.S.N.M.	10+	D2226...	37 00 00 N.; 71 54 00 W..	2,045	36.8	glob. oz......	Common.
10024	U.S.N.M.	10+	D2228...	37 25 00 N.; 73 06 00 W..	1,582	36.8	br. m........	Common.
10061	U.S.N.M.	1	D2229...	37 38 40 N.; 73 16 30 W..	1,423	37.7	glob. oz......	Rare.
10025	U.S.N.M.	2	D2234...	39 09 00 N.; 72 03 15 W..	810	38.6	gn. m........	Rare.
10026	U.S.N.M.	5	D2385...	28 51 00 N.; 88 18 00 W..	730	40.1	gy. m........	Few.
10027	U.S.N.M.	1	D2504...	44 23 00 N.; 61 22 45 W..	82	40.6	bk. m. g......	Rare.

Hormosina globulifera—material examined—Continued.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
			Albatross	° ′ ″ ° ′ ″		°*F*		
10035	U.S.N.M.	6	D2530...	40 53 30 N.; 66 24 00 W..	956	38.4	gy. oz.......	Few.
10028	U.S.N.M.	2	D2531...	40 42 00 N.; 66 33 00 W..	852	38.4	gy. m.......	Rare.
10029	U.S.N.M.	7	D2547...	39 54 30 N.; 70 20 00 W..	390	39.6	gn. m.......	Frequent.
10039	U.S.N.M.	8	D2550...	39 44 30 N.; 70 30 45 W..	1,081	38.5	br. m.......	Frequent.
10030	U.S.N.M.	8	D2550...	39 44 30 N.; 70 30 45 W..	1,081	38.5	br. m.......	Frequent.
10031	U.S.N.M.	8	D2552...	39 47 07 N.; 70 35 00 W..	721	39.6	gy. oz.......	Frequent.
10032	U.S.N.M.	10	D2562...	39 15 30 N.; 71 25 00 W..	1,434	37.3	gy. oz.......	Common.
10062	U.S.N.M.	6	D2564...	39 22 00 N.; 71 23 30 W..	1,390	37.3	gy. oz.......	Few.
10033	U.S.N.M.	2	D2571...	40 09 30 N.; 67 09 00 W..	1,356	37.8	gy. glob. oz .	Few.
10034	U.S.N.M.	8	D2581...	39 43 00 N.; 71 34 00 W..	394	....	gn. m.......	Common.
10049	U.S.N.M.	10+	D2682...	39 38 00 N.; 70 22 00 W..	1,004	....	gn. m. s.....	Common.
10041	U.S.N.M.	5	D2705...	42 47 00 N.; 61 04 00 W..	1,255	....	lt. br. oz....	Common.
10040	U.S.N.M.	10+	D2706...	41 28 30 N.; 65 35 30 W..	1,188	....	gy. oz. for...	Common.
10042	U.S.N.M.	1	D2710...	40 06 00 N.; 68 01 30 W..	984	....	gn. m.......	Rare.
10043	U.S.N.M.	7	D2713...	38 20 00 N.; 70 08 30 W..	1,859	....	br. oz.......	Few.
10044	U.S.N.M.	10+	D2714...	38 22 00 N.; 70 17 30 W..	1,825	....	br. oz.......	Common.
10045	U.S.N.M.	10	D2716...	38 29 30 N.; 70 57 00 W..	1,631	....	br. oz. for...	Common.
10046	U.S.N.M.	3	D2739...	37 34 30 N.; 73 58 00 W..	811	38.2	gy. m.......	Few.
10047	U.S.N.M.	8	D2750...	18 30 00 N.; 63 31 00 W..	496	44.5	fne. gy. s....	Frequent.
10048	U.S.N.M.	3	D2760...	12 07 00 S.; 39 17 00 W...	1,019	39.5	br. co.......	Few.
10050	U.S.N.M.	1	H79.....	14 20 30 N.; 63 10 00 W..	821	....	co. s. sh. for.	Rare.
			Fish Hawk.					
10063	U.S.N.M.	1	891......	....	1,360	37.4	glob. oz.....	Rare.
			Porcupine.					
6252	U.S.N.M.	10+	19.......	54 53 00 N.; 10 56 00 W..	....	....	....	Common.

HORMOSINA OVICULA H. B. Brady.

Plate 6, fig. 2.

Hormosina ovicula H. B. Brady, Quart. Journ. Micr. Sci., vol. 19, 1879, p. 61, pl. 4, fig. 6.—Bütschli, in Bronn, Klassen und Ordnungen des Thierreichs, vol. 1, 1880, p. 199, pl. 5, fig. 15.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 327, pl. 39, figs. 7–9.—Goës, Köngl. Svensk. Vet. Akad. Handl., vol. 25, No. 9, 1894, p. 29, pl. 6, figs. 220, 221.—Chapman, Proc. Zool. Soc. London, 1895, p. 17.—Flint, Rep. U. S. Nat. Mus., 1897 (1899), p. 280, pl. 25, fig. 2.—Chapman, The Foraminifera, 1902, p. 149, pl. 8, fig. C.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 95, fig. 138*a*, *b*.

Hormosina ovicula, var., Goës, Bull. Mus. Comp. Zoöl., vol. 29, 1896, p. 34, pl. 4, fig. 1–3.

Description.—Test long and slender, slightly tapering, composed of several fusiform chambers in a straight or slightly curved line, the base of one chamber inclosing only the end of the apertural neck of the preceding; wall thin, finely arenaceous, with abundant cement, often with a thin granular coating of light gray amorphous material and occasionally a few sponge spicules; aperture small, circular, at the end of a short, cylindrical neck, often with a short phialine lip; color yellowish brown with a distinctly darker reddish brown portion at the distal end of the neck of each chamber.

Length up to 4 mm.

Distribution.—The records for this species are not numerous. In the North Atlantic Brady had one or two specimens only from a single station off the American coast at about 40° N. latitude. It is also recorded from a *Challenger* station off Culebra Island, West Indies, and at two stations off the coast of South America. Flint records it from the southeastern coast of the United States and from the Gulf of Mexico. Goës records it from the Gulf of Mexico and the Caribbean.

The only east coast specimens I have seen are from D2505, off Nova Scotia. The remainder of the specimens are all from the Gulf of Mexico and the Caribbean Sea. The Gulf of Mexico stations are from the same or adjacent stations to those from which Goës and Flint recorded the species. The single Caribbean station, D2140, is from south of Jamaica, the material in the Goës collection.

In form and coloration this species is well marked. It is perhaps nearest to *H. carpenteri*, but is usually straight, where *H. carpenteri* is usually irregular and crooked and of much larger size. In the Gulf of Mexico, however, the species often has a coating of fine gray material and occasionally sponge spicules resembling the exterior of *H. carpenteri*. Flint's figured specimens show this character; also the more rounded chambers which the specimens from the Gulf of Mexico often have.

Hormosina ovicula—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		° F.		
10067	U.S.N.M.	3	D2377...	27 07 30 N.; 88 08 00 W..	210	67	gy. m.......	Few.
10068	U.S.N.M.	5	D2381...	28 05 00 N.; 87 56 15 W..	1,330	....	lt. br. m....	Few.
10069	U.S.N.M.	1	D2393...	28 43 00 N.; 87 14 30 W..	525	41.1	lt. gy. m....	Rare.
10070	U.S.N.M.	3	D2394...	28 38 30 N.; 87 02 00 W..	420	41.8	gn. m.......	Few.
10071	U.S.N.M.	10+	D2399...	28 44 00 N.; 86 18 00 W..	196	51.6	gy. m.......	Common.
10072	U.S.N.M.	8	D2505...	44 23 30 N.; 61 44 15 W..	93	42.3	dk. br. m...	Few.
		10	D2140...	17 36 10 N.; 76 46 05 W..	966	39.7	s............	Few.

HORMOSINA OVICULA H. B. Brady, var. MEXICANA, new variety.

Plate 6, fig. 3.

Hormosina carpenteri Goës (not *H. carpenteri* H. B. Brady), Bull. Mus. Comp. Zoöl., vol. 29, 1896, p. 35.—Flint, Ann. Rep. U. S. Nat. Mus., 1897 (1899), p. 280, pl. 25, fig. 1.

Description.—Test comparatively large, composed of numerous (as many as eight) chambers, remote, usually in a straight or slightly curved line, pyriform or fusiform, tapering toward the apertural end, which is slender, walls arenaceous, usually bristly with fine spicules; aperture small, circular, at the end of the slender neck; color yellowish brown.

Length up to 10 mm.

Distribution.—From all the records this is mainly a North Atlantic species. Brady records its occurrence from the Faroe Channel, the west coast of Ireland, and the Rockall Bank to North America, and from the Azores and Canaries to the West Indies, with a station off Pernambuco, Brazil, and another in the South Pacific.

Goës and Flint record the species from the Gulf of Mexico and Caribbean Sea, but this material is here referred to *H. ovicula* as a variety. It differs decidedly from the typical northern material.

I have had the species in very typical form from five *Albatross* stations off the northeastern coast of the United States. Also I have been fortunate in having from the United States National Museum a series from Carpenter from a *Valorous* station. This shows the same characters as the *Albatross* material from the northern station. It consists of a series of chambers, elongate pyriform in shape, fitting well over the neck of the preceding chamber, the tapering sides at the apertural end nearly straight or but very slightly concave, the end broad and truncate and the aperture without an elongate neck except for the tapering shape of the chamber. The color is a light yellowish brown and the surface decidedly sandy and although smooth to the unaided eye under the microscope the surface layer of grains is seen to be considerably roughened.

Such characters are developed off the northeastern coast of the United States, especially in deep cold water, but not in the Gulf of Mexico, and the material from this region seems to be distinct.

Hormosina carpenteri—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
10077	U.S.N.M.	10+	D2035	39 26 16 N.; 70 02 37 W	1,362		glob. oz	Common.
10078	U.S.N.M.	10+	D2038	38 30 30 N.; 69 08 25 W	2,033		glob. oz	Common.
10079	U.S.N.M.	5	D2039	38 19 26 N.; 68 20 20 W	2,369		glob. oz	Few.
10083	U.S.N.M.	3	D2713	38 20 00 N.; 70 08 30 W	1,859		br. oz	Few.
10084	U.S.N.M.	10+	D2714	38 22 00 N.; 70 17 30 W	1,825		br. oz	Common.
6251	U.S.N.M.	6	*Valorous* 9.		1,750			

HORMOSINA NORMANI H. B. Brady.

Plate 7, fig. 1.

Hormosina normani H. B. Brady, Quart. Journ. Micr. Sci., vol. 21, 1881, p. 52; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 329, pl. 39, figs. 19–23.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 95, fig. 139.—Rhumbler, Foram. Plankton Exped., teil 2, 1913, p. 441, fig. 144.—Pearcey, Trans. Roy. Soc. Edinburgh, vol. 49, 1914, p. 1007.

Description.—Test irregular, composed of a few nearly spherical chambers, rapidly increasing in size as added, very irregularly arranged; wall thin, of fine sand grains, with much cement, wall smooth; aperture small, circular, often with a short, cylindrical neck at the end or more often at the side or even near the base of the chamber; color yellowish brown.

Length up to 8 mm.

Distribution.—Brady gives this species as very rare. He had it from a *Valorous* station about latitude 59° N. in 1,750 fathoms (3,200 meters) and *Porcupine* station northwest of Ireland in 1,380 fathoms (2,524 meters). Pearcey records it from the Antarctic.

In the *Albatross* material it has occurred at six stations, three of them off our northeastern coast, one off the Leeward Islands, the others off South America, off Bahia, and Buenos Aires. Those from the northern stations are from deep water, the others much more shallow.

It is also known from the North Pacific east of Japan and from the South Pacific west of Chile and from off New Zealand.

The irregular form seems to be largely due to the peculiar character of lack of definiteness in the position of the aperture. When this occurs at the side the next chamber is added there and a very irregular form thus results.

Hormosina normani—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°*F.*		
10085	U.S.N.M.	1	D2713...	38 20 00 N.; 70 08 30 W..	1,859	....	br. oz.......	Rare.
10086	U.S.N.M.	10+	D2714...	38 22 00 N.; 70 17 30 W..	1,825	....	br. oz.......	Common.
10087	U.S.N.M.	1	D2716...	38 29 30 N.; 70 57 00 W..	1,631	....	br. oz. for...	Rare.
10088	U.S.N.M.	1	D2759...	18 30 00 N.; 63 31 00 W..	496	44.5	fne. gy. s....	Rare.
10089	U.S.N.M.	4	D2760...	12 07 00 S.; 37 17 00 W..	1,019	39.5	br. co.......	Few.
10090	U.S.N.M.	4	D2766...	36 47 00 S.; 56 23 00 W..	10.5	....	S. brk. sh...	Few.

Genus HAPLOSTICHE Reuss, 1861.

Nodosaria (part) D'ORBIGNY, Ann. Sci. Nat., vol. 7, 1826, p. 252.—REUSS, Vers. Böhm, Kreide, vol. 1, 1845–1846, p. 26, pl. 13, figs. 12–13.

Lituola (part) JONES and PARKER, Quart. Journ. Geol. Soc., vol. 16, 1860, p. 307.

Haplostiche REUSS, Sitz. Böhm. Ges. Wiss., Jahrg. 1861, p. 16 (Type, *H. foedissima* REUSS, 1865).—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 317.—CHAPMAN, The Foraminifera, 1902, p. 141.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 96.

Description.—Test free, cylindrical or tapering, composed of a linear series of chambers, interior labyrinthic; walls thick, coarsely arenaceous, but usually fairly smooth on the exterior; aperture terminal in the middle of the distal portion of the last-formed chamber, in the earlier chambers usually simple, in the adult made up of several pores or in large specimens often dendritic, occasionally with a short neck.

There seems to be but a single recent species occurring in shallow or medium depths, usually in tropical or subtropical waters.

The genus seems to occur on the western side of the Atlantic only, thence across the Pacific, where in shallow waters it is often very abundant.

Both microspheric and megalospheric forms occur.

HAPLOSTICHE DUBIA (d'Orbigny).

Plate 7, figs. 2, 3.

"Orthoceratia Zoophytica minuscula" SOLDANI, Testaceographica, vol. 1, pt. 2, 1791, p. 93, pl. 98, fig. *a*.

Nodosaria dubia D'ORBIGNY, Ann. Sci. Nat., vol. 7, 1826, p. 252, No. 10.

Lituola dubia PARKER, JONES, and H. B. BRADY, Ann. Mag. Nat. Hist., ser. 4, vol. 8, 1871, p. 263, pl. 9, fig. 30.

Lituola soldanii JONES and PARKER, Quart. Journ. Geol. Soc., vol. 16, 1860, p. 307, No. 184.

Haplostiche soldanii H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 318, pl. 32, figs. 12–18.—EGGER, Abh. Bay. Akad. Wiss. München, vol. 18, 1893, p. 263, pl. 4, figs. 34, 35.—FLINT, Rep. U. S. Nat. Mus., 1897 (1899), p. 277, pl. 21, fig. 3.—CHAPMAN, The Foraminifera, 1902, p. 141, pt. 7, figs. *H*, *h*.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 96, figs. 140–141.

Description.—Test free, elongate, subcylindrical, fusiform or ovate, made up of a usually straight, linear series of short chambers, labyrinthic in the interior; wall of coarse sand grains, firmly cemented, forming a smooth exterior except where eroded, thick; aperture in the early chambers a single opening, in adults becoming cruciform, dendritic, or in some specimens several openings formed by the fusing of the walls; color usually light gray.

Length up to 7.5 mm., diameter up to 2 mm.

Distribution.—In the Atlantic *H. dubia* seems to be restricted to the western portion from Bermuda at the north through the West Indies and Gulf of Mexico and along the coast of South America. In general it is associated with the coral reef fauna and comparatively shallow tropical waters. Brady records it from off Bermuda, in 435 fathoms (796 meters); off Jamaica, 50–100 fathoms (91–183 meters); off Culebra Island, 390 fathoms (713 meters); off South America, south of Pernambuco, 350 fathoms (640 meters); and off Rio Janeiro and from the Abrolhos Bank, off Brazil, 40–47 fathoms (73–86 meters).

Flint had it from two *Albatross* stations in the Gulf of Mexico, D2377 and D2399, in 210 and 196 fathoms (384 and 356 meters), respectively. I have had it from these and two other stations in the same region, as well as one station from the north coast of Cuba. Material available from the general West Indian region is scanty and its distribution is probably wide in the region. It is known elsewhere from off New Zealand, off the Fiji Islands (Brady), off western Australia (Egger), in the North Pacific off the Hawaiian Islands (Bagg, Cushman), and off Japan (Cushman).

Both microspheric and megalospheric forms occur, the microspheric being much larger in size and having the labyrinthic chambers more complex and the aperture dendritic, while in the megalospheric form it is smaller and simpler throughout.

HAPLOSTICHE DUBIA (d'Orbigny), var. INTERMEDIA Vanden Broeck.

Plate 7, fig. 4.

Lituola soldanii d'Orbigny, var. *intermedia* Vanden Broeck, Ann. Soc. Belg. Micr., vol. 2, 1876, p. 74, pl. 2, figs. 1, 3, 4, 6.—Cushman, Publ. 291, Carnegie Inst. Washington, 1919, p. 30, pl. 6, figs. 1-4.

Description.—Test larger than in the typical, more tapering, the chambers more distinctly marked by depressed sutures.

Vanden Broeck's specimens were from 100 fathoms (183 meters) off the Barbados. I have the variety from 100 fathoms (183 meters) also off the Barbados and two apparently similar specimens from *Albatross* D2378 in the Gulf of Mexico with the typical form. This is the fossil form of the species recorded from the Bowden beds of Jamaica.

Haplostiche dubia—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		° F.		
10225	U.S.N.M.	1	D2339	23 10 40 N.; 82 20 15 W.	191	.....	co.	Rare.
10226	U.S.N.M.	1	D2377	29 07 30 N.; 88 08 00 W.	210	67	gy. m	Few.
10227	U.S.N.M.	10+	D2378	29 14 30 N.; 88 09 30 W.	68	.....	gy. m	Common.
10228	U.S.N.M.	10+	D2399	28 44 00 N.; 86 18 00 W.	196	51.6	gy. m	Common.
10229	U.S.N.M.	9	D2404	28 44 00 N.; 85 16 00 W.	60	.....	gy. s.	Common.

Subfamily 3. TROCHAMMININAE.

Description.—Test composed of several chambers, either in a planospiral coil, trochoid, or otherwise arranged, wall composed of sand grains of varying degrees of coarseness cemented with a calcareous or ferruginous cement, free or attached.

This subfamily as here used contains the many-chambered arenaceous forms not arranged in a linear series throughout. Except the large, somewhat anomalous forms, *Neusina agassizii* and *Botellina labyrinthica* for which a separate subfamily has been made. Some of the species, such as *Ammobaculites tenuimargo*, appear to be largely made up of a linear series, but have a close-coiled early portion not seen in the Reophacinae.

Genus TROCHAMMINOIDES Cushman, 1910.

Trochamminoides CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 97. (Type, *Trochammina proteus* Karrer.)

Description.—Test free, typically planospiral, composed of several coils, each constricted into a number of chamber-like portions with the openings between large; wall of fine sand and a yellowish-brown cement; aperture simple at the end of the last-formed chamber.

This species frequently shows a tendency to continue the *Ammodiscus* condition through one or more of the early coils, and the later portion only may be divided, or in other specimens the divisions may occur much earlier. By its early development the genus seems to have been derived from an *Ammodiscus* condition, as its earlier development consists of a proloculum and long coiled chamber as in *Ammodiscus*, but its later constricted condition foreshadows the condition of complete division seen in the chambered coiled forms usually assigned to *Haplophragmium* and *Trochammina*.

TROCHAMMINOIDES PROTEUS (Karrer).

Plate 8, fig. 7.

Trochammina proteus KARRER, Sitz. Akad. Wiss. Wien, vol. 52 (Abth. 1), 1865 (1866), p. 494, pl., fig. 8 (not 1-7).—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 341, pl. 40, figs. 1-3.—HAEUSLER, Neues Jahrb., Beil, vol. 4, 1885, p. 28, pl. 3, fig. 24 (25-27?).—EGGER, Abh. Bay. Akad. Wiss. München, vol. 18, 1893, p. 266, pl. 5, figs. 7, 8 (?).—GOËS, Bull. Mus. Comp. Zoöl., vol. 29, 1896, p. 33.—EIMER and FICKERT, Zeitschr. Wiss. Zool., vol. 65, 1899, p. 694, fig. 42 (in text).—FLINT, Rep. U. S. Nat. Mus., 1897 (1899), p. 281, pl. 25, fig. 3.—BAGG, Proc. U. S. Nat. Mus., vol. 34, 1908, p. 128.

Trochamminoides proteus CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 98, figs. 142-144.

Ammodiscus proteus RHUMBLER, Arch. Prot., vol. 3, 1903, p. 281, fig. 131 (in text).

Description.—Test free, typically planospiral, composed of several coils, the earlier ones usually unconstricted and undivided, the later ones divided into several chambers with corresponding constrictions of the wall; material of the wall fine sand and a yellowish or reddish-brown cement, fairly smooth; chambers of unequal length; aperture large with the border thickened.

Diameter, 1-1.5 mm.

Distribution.—From the records this is a widely distributed but not common species. The *Challenger* specimens are from off the Canaries, 1,125 fathoms (2,057 meters); two stations off Culebra Island, West Indies, 390 and 450 fathoms (713 and 823 meters); and off Brazil, 675 fathoms (1,234 meters). Goës had it from the Caribbean and Flint from both the Caribbean and Gulf of Mexico. I have had it in the *Albatross* material from off Nova Scotia, in the Gulf of Mexico, off Yucatan, and from the Caribbean.

It seems rather difficult to distinguish between this species and the early chambers of *Lituotuba lituiformis*. There are also two forms both of which are figured by Brady in the *Challenger* Report. Figures 1 and 2 of plate 40 in that report show specimens more or less irregularly coiled in the early portion and the chambers much longer than wide. Figure 3 of the same plate shows a form in which the chambers are of nearly equal size, about as long as wide and the whole test planospiral. Such specimens occurred at D2383 in the Gulf of Mexico but were not obtained elsewhere, the others all being of the irregular form first noted.

Trochamminoides proteus—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ; ° ′ ″		°F.		
10615	U.S.N.M.	1	D2355...	20 58 48 N.; 86 27 00 W..	399	....	yl. oz.......	Rare.
10616	U.S.N.M.	3	D2383...	28 32 00 N.; 88 06 00 W..	1,181	39.8	br. gn. m...	Rare.
10230	U.S.N.M.	1	D2393...	28 43 00 N.; 87 14 30 W..	525	41.1	lt. gy. m.....	Rare.
10231	U.S.N.M.	2	D2394...	28 38 30 N.; 87 02 00 W..	420	41.8	gn. m.......	Rare.
10232	U.S.N.M.	2	D2505...	44 23 30 N.; 61 44 15 W..	93	42.3	dk. br. m....	Rare.
10233	U.S.N.M.	1	H47.....	17 46 30 N.; 65 10 25 W..	1,482	....	crs. co. s. brk. sh. for.	Rare.
10234	U.S.N.M.	1	H79.....	14 20 30 N.; 63 10 00 W..	821	....	co. s. sh. for..	Rare.

Genus HAPLOPHRAGMOIDES Cushman, 1910.

Haplophragmoides CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 99 (Type *Haplophragmium canariense* (d'Orbigny)).

Description.—Test free, planospiral, composed of several coils, each composed of a number of chambers, wall arenaceous, varying much in texture and in the relative amount of cement in the different species, aperture at the ventral border or on the lower portion of the apertural face of the chamber.

Included in this genus are the various completely coiled, planospiral, arenaceous species with simple apertures which have usually been assigned to *Haplophragmium* or *Trochammina*. The type species of the former genus is an uncoiled form with multiple apertures, and the type species of the latter genus has a trochoid spiral test. As here recognized, the species of *Haplophragmoides* have approximately an equal portion of chambers of the test visible from the two sides. Included here are both the species with an excess of cement often placed in *Trochammina* and those of coarser texture, which have been assigned to *Haplophragmium*.

HAPLOPHRAGMOIDES CANARIENSIS (d'Orbigny).

Plate 8, fig. 1.

Nonionina canariensis D'ORBIGNY in Barker-Webb and Berthelot, Hist. Nat. Îles Canaries, vol. 2, pt. 2, Foraminifères, 1839, p. 128, pl. 2, figs. 33,34.

Placopsilina canariensis PARKER and JONES, Ann. Mag. Nat. Hist., ser. 2, vol. 19, 1857, p. 301, pl. 10, figs. 13, 14.

Lituola canariensis W. B. CARPENTER, PARKER, and JONES, Intr. Foram., 1862, pl. 6, figs. 39, 40, 41.—H. B. BRADY, Trans. Linn. Soc. London, vol. 24, 1864, p. 472.—CARTER, Ann. Mag. Nat. Hist., ser. 4, vol. 19, 1877, pl. 13, figs. 26–29.

Lituola nautiloidea, var. *canariensis* PARKER and JONES (part), Philos. Trans., vol. 155, 1865, p. 406, pl. 15, figs. 45*a*, *b*; pl. 17, figs. 92–95.

Haplophragmium canariensis SIDDALL, Cat. Rec. British Foram., 1879, p. 4.—BÜTSCHLI, in Bronn's Klassen und Ordnungen des Thierreichs, vol. 1, 1880, p. 192, pl. 5, fig. 17.—H. B. BRADY, Denkschr. Akad. Wiss. Wien, vol. 42, 1881, p. 99; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 310, pl. 35, figs. 1–5.—HAEUSLER, Neues Jahrb., vol. 4, 1885, p. 12, pl. 1, figs. 17–20.—H. B. BRADY, PARKER, and JONES, Trans. Zool. Soc., vol. 12, 1888, p. 218, pl. 41, fig. 9.—BALKWILL and WRIGHT, Trans. Roy. Irish Acad., vol. 28, 1888, p. 330.—HAUESLER, Abh. Schweiz. Pal. Ges., vol. 17, 1890, p. 34, pl. 4, figs. 1–3.—J. WRIGHT, Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 468.—EGGER, Abh. Bay. Akad. Wiss. München, vol. 18, 1893, p. 261, pl. 5, figs. 27–29.—GOËS, Köngl. Svensk. Vet. Akad. Handl., vol. 25, No. 9, 1894, p. 20, pl. 5, figs. 92–101.—CHAPMAN, Ann. Mag. Nat. Hist., ser. 6, vol. 16, 1895, p. 314, pl. 11, fig. 5 (?); Proc. Zool. Soc. London, 1895, p. 16.—GOËS, Bull. Mus. Comp. Zoöl., vol. 29, 1896, p. 30.—MILLETT, Journ. Roy. Micr. Soc., 1899, p. 359.—FLINT, Rep. U. S. Nat. Mus., 1897 (1899), p. 277, pl. 20, fig. 3.—EARLAND, Journ. Quekett Micr. Club, ser. 2, vol. 9, 1905, p. 200.—SIDEBOTTOM, Mem. Proc. Manchester Lit. and Philos. Soc., vol. 49, pt. 2, No. 5, 1905, p. 4.—CHAPMAN, Trans. New Zealand Inst., vol. 38, 1905 (1906), p. 84; Journ. Quekett Micr. Club, vol. 10, 1907, p. 126, pl. 9, fig. 3.—BAGG, Proc. U. S. Nat. Mus., vol. 34, 1908, p. 126.—HERON-ALLEN and EARLAND, Journ. Roy. Micr. Soc., 1909, p, 323.—AWERINZEW, Mem. Acad. Imp. Sci. St. Petersbourg, ser. 8, vol. 29, No. 3, 1911, p. 20.—BAGG, Bull. 513, U. S. Geol. Surv., 1912, p. 33, pl. 7, figs. 1*a*-*h*.—HERON-ALLEN and EARLAND, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 45, pl. 3, fig. 5.—CHAPMAN, Zool. Results "Endeavour," vol. 1. pt. 3, 1915, p. 311.—HERON-ALLEN and EARLAND, Trans. Zool. Soc. London, vol. 20, 1915, p. 614; Trans. Linn. Soc. London, vol. 11, pt. 13, 1916, p. 223, pl. 40, figs. 12, 13.

Haplophragmoides canariensis CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 101, fig. 149.—PEARCEY, Trans. Roy. Soc. Edinburgh, vol. 49, 1914, p. 1008.

Nonionina jeffreysii WILLIAMSON, Rec. Foram. Great Britain, 1858, p. 34, pl. 3, figs. 72, 73.

Haplophragmium jeffreysii BERTHELIN, Foram. de Bourgneuf et Pornichet, 1878, p. 24, No. 20.

Description.—Test free, planospiral, composed of a few coils partially involute or almost completely so, umbilicate; chambers subglobular, somewhat compressed laterally, six or seven chambers in the final coil, the last chamber somewhat larger than in the preceding ones, sutures indistinct, periphery somewhat lobulated, wall arenaceous, made up of sand grains, but rather smoothly finished, thin; aperture at the base of the last-formed chamber narrow, the overhanging portion of the wall slightly extended, forming a thin lip; color a grayish brown, the last-formed chamber often more gray than the preceding ones.

Diameter, 0.75–1.5 mm.

Distribution.—This species from the synonymy given above will be at once seen to have been recorded by many writers from widely distant areas. Evidently, from a comparison of figures referred to this species, there is a considerable range in form, size, and general characters or else more than one species is included under this name. The original figure given by d'Orbigny is very close to one species found in comparatively shallow water off our Atlantic coast, and to this the name *H. canariensis* is here restricted. As the other records are based on a loose application of the name, no attempt is here made to straighten out the problem, which can only be accomplished by a study of the actual specimens. However, it may be noted that of Brady's figures plate 35, figure 1, is very close to the material from the western Atlantic.

All seven stations from which material was obtained are between 37° and 40° N. latitude and 71° and 75° W. longitude. I have also found it in shallow-water material off the New England coast in my own dredgings.

Haplophragmoides canariensis—*material examined.*

Cat. No.	Coll. of—	No of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
10294	U.S.N.M.	7	D2033...	37 16 30 N.; 74 20 36 W..	641	......	....	Few.
10295	U.S.N.M.	1	D2171...	37 59 30 N.; 73 48 40 W..	444	39.5	gn. m.......	Rare.
10296	U.S.N.M.	3	D2202...	39 38 00 N.; 71 39 45 W..	515	39.1	gn. m.......	Few.
10297	U.S.N.M.	1	D2203...	39 34 15 N.; 71 41 15 W..	705	38.9	gn. m. s.....	Rare.
10298	U.S.N.M.	1	D2204...	39 30 30 N.; 71 44 30 W..	728	39.1	br. m.......	Rare.
10299	U.S.N.M.	1	D2205...	39 35 00 N.; 71 18 45 W..	1,073	38.1	gy. oz.......	Rare.
10300	U.S.N.M.	3	D2581...	39 43 00 N.; 71 34 00 W..	394	....	gn. m.......	Few.

HAPLOPHRAGMOIDES MAJOR, new species.

Plate 8, fig. 6.

Description.—Test planospiral, involute, umbilicate, composed of about three coils, periphery broadly rounded, slightly lobulate, usually nine chambers in the last coil of adult specimens, sutures distinct; wall coarsely arenaceous, surface fairly smooth, aperture an elongate semicircular slit at the base of the final chamber, the upper portion forming a thin lip; color gray or light brown.

Diameter.—Type specimen (U.S.N.M. No. 10675a) from *Albatross* D2453 in the Gulf of St. Lawrence in 82 fathoms (150 meters). It also occurred south of Newfoundland on the Grand Banks and at four stations south of Marthas Vineyard and Nantucket, all at depths less than 75 fathoms (137 meters). Specimens occurre most of these stations in considerable numbers.

This species, which would probably be included by some writ under *H. canariensis*, seems to be distinct from that species as co sidered here. It is much larger, has a larger number of chambe is thicker, and more nearly circular in side view. Its range is app ently mostly confined to waters of less than a hundred fathoms depth. It is closely similar to the specimen figured by Brady in t *Challenger* report (pl. 35, fig. 4).

Haplophragmoides major—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundan
10671	U.S.N.M.	10+	D2240...	40 [illegible]	[illegible]	[illegible]	[illegible]	[illegible]
10672	U.S.N.M.	1	D2242...	40 15 [illegible]	[illegible]	[illegible]	[illegible]	[illegible]
10673	U.S.N.M.	10+	D2251...	40 [illegible]	[illegible]	[illegible]	[illegible]	[illegible]
10674	U.S.N.M.	10+	D2253...	40 34 [illegible]	32	52.9	gy. s. bk. sp.	Common.
10675	U.S.N.M.	10+	D2453...	47 20 00 [illegible] 51 02 00 W..	82	29.7	gn. m. fne. s .	Common.
3081	U.S.N.M.	5						
3085	U.S.N.M.	1						
10676	U.S.N.M.	4	D2465...	45 35 00 N.; 55 01 00 W..	67	30	bk. gy. s....	Frequent.

HAPLOPHRAGMOIDES EMACIAT[illegible]

[illegible]e 8, fig. 4.

Haplophragmium emaciatum H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 305, pl. 33, figs. 26–28.—EGGER, Abh. Bay. Akad. Wiss. Münch[illegible], vol. 18, 1893, p. 262, pl. 5, figs. 53, 54.—CHAPMAN, Proc. Zool. Soc. London, 1895, p. 16 (?).—FLINT, Rep. U. S. Nat. Mus., 1897 (1899), p. 276, pl. 19, fig. 5.

Haplophragmium compressum MILLETT (not *Haplophragmium compressum* Goës) Journ. Roy. Micr. Soc., 1899, p. 359, pl. 5, fig. 8.—HERON-ALLEN and EARLAND, Trans. Zool. Soc. London, vo[illegible] 15, p. 613, pl. 46, figs. 20, 21.

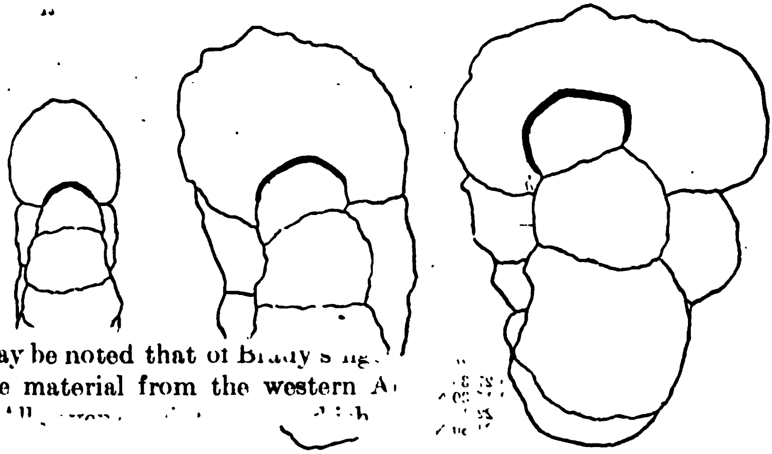
Haplophragmoides emaciatum CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 1, 1910 p. 102, fig. 150–152.

Description.—Test planospiral, composed of three or more coils not completely involute, compressed in the earlier coils but the las few chambers typically inflated, chambers 7–8 in the last-formed coil rapidly increasing in breadth in the last-formed portion; wall composed of sand grains with a varying amount of sponge spicu[illegible] somewhat roughly finished, interior smooth, the wall especially i the last-formed chamber thick and labyrinthic resembling *Cyclammina* in this respect; aperture a narrow, elongate, somewhat curve slit at the base of the last-formed chamber; color yellowish or reddisl brown, occasionally white or gray.

Diameter up to 1.75 mm.

Distribution.—Brady in his original notes on this species says tha his best specimens were from *Challenger* station 23, off Sombrer

Island, West Indies, 450 fathoms (823 meters), and 24, off Culebra Island, 390 fathoms (713 meters). Flint records it from the coast of Brazil and from just south of Cuba. I have had an abundance of material, mostly from along our Atlantic coast, from south of



may be noted that of [illegible]

the material from the western A[illegible]

FIGS. 1-3.—HAPLOPHRAGMOIDES EMACIATUM, × 30. APERTURAL VIEWS SHOWING INCREASE IN BREADTH AT VARIOUS STAGES.

Nova Scotia to the Carolina coast, and again at a group of six stations in the northern part of the Gulf of Mexico, with a single station in the Caribbean.

Haplophragmoides emaciatum—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		° F.		
10327	U.S.N.M.	10+	D2003...	37 16 30 N.; 74 20 36 W..	641	....	....	Common.
10328	U.S.N.M.	8	D2018...	37 12 22 N.; 74 20 04 W..	788	39	bu. m.......	Frequent.
10329	U.S.N.M.	2	D2072...	41 53 00 N.; 65 35 00 W..	858	39	gy. m.......	Few.
10330	U.S.N.M.	7	D2110...	35 12 10 N; 74 57 15 W..	516	40	bu. m.......	Frequent.
10331	U.S.N.M.	8	D2111...	35 09 50 N; 74 57 40 W..	938	....	gn. m.......	Frequent.
10332	U.S.N.M.	1	D2115...	35 49 30 N.; 74 34 45 W..	843	39	m. fue. s....	Rare.
10333	U.S.N.M.	1	D2150...	13 34 45 N; 81 21 10 W..	382	45.75	wh. crs. s....	Rare.
10334	U.S.N.M.	10+	D2171...	37 59 30 N.; 73 48 40 W..	444	39.5	gn. m.......	Common.
10335	U.S.N.M.	9	D2189...	39 49 30 N.; 70 26 00 W..	600	39.7	gn. m. s.....	Common.
10336	U.S.N.M.	10+	D2202...	39 38 00 N; 71 39 45 W..	515	39.1	gn. m.......	Common.
10337	U.S.N.M.	10+	D2203...	39 34 15 N.; 71 41 15 W..	705	38.9	gn. m. s.....	Common.
10338	U.S.N.M.	7	D2204...	39 30 30 N.; 71 44 30 W..	728	39.1	br. m.......	Frequent.
10339	U.S.N.M.	1	D2219...	39 46 22 N.; 69 29 00 W..	948	38.8	gy. m.......	Rare.
[illegible]	U.S.N.M.	10+	D2234...	39 09 00 N.; 72 03 15 W..	810	38.6	gn. m.......	Common.
10341	U.S.N.M.	3	D2240...	40 27 30 N.; 70 29 00 W..	44	....	gn. m.......	Few.
10342	U.S.N.M.	1	D2263...	37 08 00 N.; 74 33 00 W..	430	....	gn. m.......	Rare.
10343	U.S.N.M.	1	D2311...	32 55 00 N; 77 54 00 W..	79	59.1	crs. s. bk. sp.	Rare.
10344	U.S.N.M.	1	D2385...	28 51 00 N.; 88 18 00 W..	730	40.1	gy. m.......	Rare.
10345	U.S.N.M.	10+	D2377...	29 07 30 N.; 88 08 00 W..	210	67	gy. m.......	Common.
10346	U.S.N.M.	3	D2381...	28 05 00 N.; 87 56 15 W..	1,330	....	lt. br. m.....	Few.
10347	U.S.N.M.	1	D2393...	28 43 00 N.; 87 14 30 W..	525	41.1	lt. gy. m....	Rare.
10348	U.S.N.M.	5	D2394...	28 38 30 N.; 87 02 00 W..	420	41.8	gn. m.......	Few.
10349	U.S.N.M.	4	D2399...	28 44 00 N; 86 18 00 W..	196	51.6	gy. m.......	Few.
10350	U.S.N.M.	10+	D2547...	39 54 30 N.; 70 20 00 W..	390	39.6	gn. m.......	Common.
10351	U.S.N.M.	7	D2550...	39 44 30 N.; 70 30 45 W..	1,081	38.5	br. m.......	Frequent.
10352	U.S.N.M.	8	D2552...	39 47 07 N.; 70 35 00 W..	721	39.6	gy. oz.......	Frequent.
10353	U.S.N.M.	10+	D2581...	39 43 00 N; 71 34 00 W..	394	....	gn. m.......	Common.
10354	U.S.N.M.	5	D2586...	39 02 40 N.; 72 40 00 W..	328	40.2	dk. gy. m....	Frequent.
10355	U.S.N.M.	8	D2689...	39 42 00 N.; 71 15 30 W..	525	....	gn. m.......	Frequent.
10356	U.S.N.M.	1	D2710...	40 06 00 N.; 68 01 30 W..	984	....	gn. m.......	Rare.
10357	U.S.N.M.	4	D2739...	37 34 30 N.; 73 58 00 W..	811	38.2	gy. m.......	Few.

HAPLOPHRAGMOIDES SCITULUM (H. B. Brady).

Plate 8, fig. 2.

Haplophragmium scitulum H. B. Brady, Quart. Journ. Micr. Sci., vol. 21, 1881, p. 50; Proc. Roy. Soc. Edinburgh, vol. 11, 1882, p. 711; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 308, pl. 34, figs. 11-13.—Chapman, Proc. Zool. Soc. London, 1895, p. 16.—Flint, Rep. U. S. Nat. Mus., 1897 (1899), p. 276, pl. 20, fig. 2.

Haplophragmoides scitulum Cushman, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 103, fig. 153-155.—Pearcey, Trans. Roy. Soc. Edinburgh, vol. 49, 1914, p. 1008.

Description.—Test planospiral, somewhat compressed, excavated in the umbilical region, composed of about three coils, partially involute, periphery broadly rounded, not lobulated; chambers 8-11 in the last-formed coil, broad and low, sutures distinct but only slightly depressed; wall firmly cemented, arenaceous, smoothly finished; aperture a simple curved slit at the base of the final chamber; color of the test various shades of brown, the last formed chamber and sometimes the whole test gray.

Diameter 0.75–1 mm.

Distribution.—There are numerous records for the Atlantic, the *Challenger* obtaining it at several stations from the Faroe Channel to the Cape Verde Islands, thence across to the West Indies, and in the South Atlantic off Buenos Aires (Brady). The *Scotia* obtained it at four stations in the South Atlantic and Antarctic in 1,410–2,500 fathoms (2,579–4,572 meters) (Pearcey). Flint records it from off the northeastern coast of the United States and south of Cuba. From the *Albatross* material I have examined it has been found at 16 stations, 3 in the Gulf of Mexico, where it was rare, and the others off the northeastern coast of the United States. It was not common at any station.

The species seems to be well characterized, the umbilicate form with the truncate inner margins, the regular curve of the test, numerous even chambers nearly flush with one another will serve to identify it.

Haplophragmoides scitulum—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
10266	U.S.N.M.	6	D2018...	37 12 22 N.; 74 20 04 W..	788	39	bu. m.......	Few.
10267	U.S.N.M.	1	D2059...	38 19 26 N.; 68 20 20 W..	2,369	....	glob. oz.....	Rare.
10268	U.S.N.M.	4	D2013...	39 49 00 N.; 68 28 30 W..	1,467	38.5	glob. oz.....	Few.
10525	U.S.N.M.	1	D2052...	39 40 05 N.; 69 21 25 W..	1,098	45	glob. oz.....	Rare.
10269	U.S.N.M.	2	D2160...	23 10 31 N.; 82 20 37 W..	167	....	co...........	Rare.
10270	U.S.N.M.	3	D2202...	39 38 00 N.; 71 39 45 W..	515	39.1	gn. m.......	Few.
10271	U.S.N.M.	1	D2247...	40 03 00 N.; 69 57 00 W..	78	51.9	gn. m. s.....	Rare.
10272	U.S.N.M.	2	D2394...	28 38 30 N.; 87 02 00 W..	420	41.8	gn. m.......	Rare.
10273	U.S.N.M.	1	D2398...	28 45 00 N.; 86 26 00 W..	227	48.6	gy. m.......	Rare.
10274	U.S.N.M.	1	D2542...	40 00 15 N.; 70 42 20 W..	129	47.2	s. brk. sh....	Rare.
10275	U.S.N.M.	3	D2550...	39 44 30 N.; 70 30 45 W..	1,081	38.5	br. m.......	Few.
10276	U.S.N.M.	1	D2555...	39 53 00 N.; 71 32 00 W..	136	47.7	gn. m. s......	Rare.
10277	U.S.N.M.	5	D2568...	39 15 00 N.; 68 08 00 W..	1,781	36.9	gy. oz.......	Few.
10278	U.S.N.M.	2	D2581...	39 43 00 N.; 71 34 00 W..	394	....	gn. m........	Rare.
10279	U.S.N.M.	1	D2684...	39 35 00 N.; 70 54 00 W..	1,106	....	br. c. bk. sp..	Rare.
10280	U.S.N.M.	6	D2706...	41 28 30 N.; 65 35 30 W..	1,188	....	gy. oz. for....	Few.

HAPLOPHRAGMOIDES TRULLISSATA (H. B. Brady).

Plate 9, fig. 5.

Trochammina trullissata H. B. BRADY, Quart. Jour. Micr. Sci., vol. 19, 1879, p. 56, pl. 5, figs. 10*a*, *b*, 11; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 342, pl. 40, figs. 14-16 (not fig. 13).—HAEUSLER, Abh. Schweiz. Pal. Ges., vol. 17, 1890, p. 64, pl. 10, figs. 9, 11.—EGGER, Abh. Bay. Akad. Wiss. München, vol. 18, 1893, p. 265, pl. 5, figs. 25, 26 (?).—CHAPMAN, Proc. Zool. Soc. London, 1895, p. 18.—GOËS, Bull. Mus. Comp. Zoöl., vol. 29, 1896, p. 33.—MILLETT, Journ. Roy. Micr. Soc., 1899, p. 364.—BAGG, Bull. 513, U. S. Geol. Surv., 1912, p. 34, pl. 7, figs. 2*a*, *b*.

Haplophragmoides trullissata CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 100, figs. 148*a*, *b*.—PEARCEY, Trans. Roy. Soc. Edinburgh, vol. 49, 1914, p. 1008.

Description.—Test small, planospiral, composed of about three coils, not completely involute, the chambers of earlier coils visible at the center in the umbilical region which is also depressed, periphery slightly lobulated, chambers numerous, 7–9 in the last-formed coil, subglobular, sutures distinct, slightly depressed, wall of fine sand grains with an excess of yellowish or reddish brown cement, smooth and polished; aperture a short narrow slit slightly above the base of the chamber; color yellowish or reddish brown.

Diameter, 0.5–1.25 mm.

Distribution.—This species is very widely distributed in all the ocean basins but is never abundant. More of the stations are in cold water than elsewhere, although the specimens are more common in material from off the southwest of Ireland than at any other station from which I have seen material.

The *Challenger* stations cover the Atlantic well. Goës records it from the Caribbean. It occurs at several stations in cold water off the northeastern United States and at one station in the Gulf of Mexico and two in the Caribbean. The *Scotia* had it from the South Atlantic and Antarctic. The most northerly station is Davis Strait from which the first known specimens were obtained. Egger records it from two *Gazelle* stations off the west coast of Africa, but his figures are difficult to make sure of and it may or may not be this species.

Haplophragmoides trullissata—material examined.

Cat. No.	Coll. of—	No. of speci-mens.	Station.	Locality.	Depth in fath-oms.	Bottom tem-pera-ture.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		° *F.*		
10252	U.S.N.M.	1	D2035...	39 26 16 N.; 70 02 37 W..	1,362	....	glob. oz.....	Rare.
10262	U.S.N.M.	1	D2036...	38 52 40 N.; 69 24 40 W..	1,735	38	glob. oz.....	Rare.
10253	U.S.N.M.	1	D2078...	41 11 30 N.; 66 12 20 W.	499	40	gy. m. and s.	Rare.
10254	U.S.N.M.	8	D2262...	39 54 45 N.; 69 29 45 W..	250	41.6	gn. m. s.....	Few.
10255	U.S.N.M.	1	D2393...	28 43 00 N.; 87 14 30 W..	525	41.1	lt. gy. m....	Rare.
10256	U.S.N.M.	3	D2525...	41 49 00 N.; 65 49 30 W..	72	43.6	s. g. brk. s ..	Rare.
10257	U.S.N.M.	2	D2530...	40 53 30 N.; 66 24 00 W..	956	38.4	gy. oz.......	Rare.
10258	U.S.N.M.	2	D2550...	39 44 30 N.; 70 30 45 W..	1,081	38.5	br. m.......	Rare.
10259	U.S.N.M.	1	D2562...	39 15 30 N.; 71 25 00 W..	1,434	37.3	gy. oz.......	Rare.
10260	U.S.N.M.	1	H43.....	18 04 30 N.; 65 01 10 W..	1,146	....	co. s. for.....	Rare.
10261	U.S.N.M.	1	H82..:..	13 29 00 N.; 62 42 40 W..	1,051	....	for. m. bk. sp	Rare.

HAPLOPHRAGMOIDES NITIDUM Goës.

Haplophragmium nitidum Goës, Bull. Mus. Comp. Zoöl., vol. 29, 1896, p. 30, pl. 3, figs. 8, 9.

Description.—Test small, planospiral, subglobular, composed of two or three coils, periphery broadly rounded, somewhat lobulated, last coil composed of four chambers, each of which is broad, but low, either completely involute or leaving a very small but deep umbilicus, wall composed of fine sand grains with much fine reddish-brown cement, the surface neatly finished and with a dull luster; aperture a long, narrow, semicircular slit near but not at the base of the chamber, with a slight lip above and below; color reddish-brown except the last-formed chamber, which may be gray.

Diameter up to 0.5 mm.

Distribution.—Typical specimens are from three *Albatross* stations from the Gulf of Mexico, two in the Caribbean, one off Central America, the other southeast of Puerto Rico, and from two stations off the coast of South Carolina. It was not found at all in the mass of material north of this region. It is a small but very definite species and seems to have a limited range so far as is known.

It is very similar in form to *Pullenia sphaeroides* and is another case of parallelism where two species in entirely different families have evolved the same form of test. The Goës material was recorded from H133 in 533 fathoms (975 meters) in the Caribbean, H419 in 1,356 fathoms (2,480 meters) and D2392 in 724 fathoms (1,324 meters) in the Gulf of Mexico. There are no specimens in the Goës collection returned by him to the U. S. National Museum.

Haplophragmoides nitidum—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
10634	U.S.N.M.	1	D2150	13 34 45 N.; 81 21 10 W.	382	45.75	wh. crs. s.	Rare.
10636	U.S.N.M.	2	D2383	28 32 00 N.; 88 06 00 W.	1,181	39.8	br. gn. m.	Few.
10637	U.S.N.M.	1	D2392	28 47 30 N.; 87 27 00 W.	724	40.7	br. gy. m.	Rare.
10638	U.S.N.M.	5	D2393	28 43 00 N.; 87 14 30 W.	525	41.1	lt. gy. m.	Few.
10639	U.S.N.M.	1	D2678	32 40 00 N.; 76 40 30 W.	731	38.7	lt. gy. oz.	Rare.
10640	U.S.N.M.	4	D2679	32 40 00 N.; 76 40 30 W.	782	38.6	lt. gy. oz.	Few.
10641	U.S.N.M.	1	H54	17 34 20 N.; 65 25 00 W.	990	....	co. s. for.	Rare.

HAPLOPHRAGMOIDES SPHAERILOCULUM Cushman.

Plate 8, fig. 3.

Haplophragmoides sphaeriloculum Cushman, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 107, fig. 165.

Description.—Test free, planospiral, consisting of five chambers in the last-formed coil, partially involute, periphery deeply lobulated; chambers inflated, nearly as broad as high, sutures depressed;

wall finely arenaceous, with much cement, surface smooth; aperture a short, narrow slit at the base of the final chamber; color usually yellowish brown.

Diameter up to 1 mm.

Distribution.—This species was originally described from off Japan. Single specimens very evidently of the same species have occurred at six Atlantic stations—four off the northeast coast of the United States, one in the Gulf of Mexico, and the other off the coast of South America.

It can be distinguished by the globose character of the few visible chambers and the smooth wall, giving a globigerine appearance to the test if it were not for the arenaceous character of the wall.

Haplophragmoides sphaeriloculum—material examined.

Cat. No.	Coll. of—	No. of speci-mens.	Station.	Locality.	Depth in fath-oms.	Bot-tom tem-pera-ture.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
10289	U.S.N.M.	1	D2048...	40 02 00 N.; 68 50 30 W..	547	29	crs. s. m. and g.	Rare.
10290	U.S.N.M.	1	D2097...	37 56 20 N.; 70 57 30 W..	1,917	......	glob. oz.....	Rare.
10291	U.S.N.M.	1	D2192...	39 46 30 N.; 70 14 45 W..	1,060	38.6	gy. oz.......	Rare.
10292	U.S.N.M.	1	D2372...	29 15 30 N.; 85 29 30 W..	27	......	g...........	Rare.
10520	U.S.N.M.	1	D2570...	39 54 00 N.; 67 05 30 W..	1,813	36.8	glob. oz.....	Rare.
10293	U.S.N.M.	1	D2761...	15 39 00 S.; 38 32 54 W..	818	39	pter. oz.....	Rare.

HAPLOPHRAGMOIDES SUBGLOBOSUM (G. O. Sars).

Plate 8, fig. 5.

Lituola subglobosa M. Sars, Förh. Vid. Selsk. Christiania, 1868 (1869), p. 250 (*nudum nomen*).—G. O. Sars, Förh. Vid. Selsk. Christiania, 1871 (1872), p. 253.

Haplophragmium subglobosum H. B. Brady, Denkschr. Akad. Wiss. Wien, vol. 43, 1881, p. 100; Ann. Mag. Nat. Hist., ser. 5, vol. 8, 1881, p. 406.

Haplophragmium latidorsatum H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 307, pl. 34, figs. 7, 8, 10, 14 (?) (not fig. 9), (not *Nonionina latidorsatum* Bornemann, 1855).—Chapman, Journ. Roy. Micr. Soc., 1892, p. 323, pl. 5, figs. 12*a*, *b*.—Goës, Kongl. Svensk. Vet. Akad. Handl., vol. 25, No. 9, 1894, p. 21, pl. 5, figs. 102-123.—Chapman, Proc. Zool. Soc. London, 1895, p. 15.—Goës, Bull. Mus. Comp. Zoöl., vol. 29, 1896, p. 29.—Flint, Ann. Rep. U. S. Nat. Mus., 1897 (1899), p. 276, pl. 20, fig. 1.—Millett, Journ. Roy. Micr. Soc., 1899, p. 360.—Heron-Allen and Earland, Journ. Roy. Micr. Soc., 1911, p. 308; Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 46, pl. 2, figs. 15, 16.

Haplophragmoides subglobosum Cushman, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 105, figs. 162-164.—Pearcey, Trans. Roy. Soc. Edinburgh, vol. 49, 1914, p. 1008.

Description.—Test subglobose, usually planospiral, consisting of two or more coils, involute, umbilical region depressed, periphery very slightly if at all lobulated, chambers seven or eight in the last-formed coil, broad and low, sutures very slightly depressed; wall arenaceous, somewhat roughened, usually smooth within; aperture a more or less elongated, curved slit at the base of the apertural face of the chamber, simple; color gray or brown.

Diameter, 1–2.5 mm.

Distribution.—This species is common in the colder waters of the Atlantic coast, but is less so in the warmer waters of the Gulf of Mexico and Caribbean Sea. The 30 *Challenger* stations in the Atlantic cover the whole area. It is common on the northern and eastern coasts of Europe and known from the colder waters of Franz Josef Land, Spitzbergen, and Baffins Bay. The *Scotia* material from the Antarctic had this species at nine stations as recorded by Pearcey.

The reason for using *H. subglobosa* Sars instead of *H. latidorsatum* Bornemann has been discussed in an earlier paper.[1]

By many writers this specific name has been used to include the species here known as *Cribrostomoides bradyi* so that the distribution of the two should be checked where possible. *Cribrostomoides* may be easily distinguished in the adult by the row of pores forming the aperture while the aperture of *H. subglobosum* is always simple.

The slight departure of the last coil from the true planospiral form is often characteristic.

Haplophragmoides subglobosum—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
10301	U.S.N.M.	10+	D2003 ..	37 16 30 N.; 74 20 36 W..	641	....	....	Common.
10302	U.S.N.M.	7	D2037...	38 53 00 N.; 69 23 30 W..	1,731	38	glob. oz......	Frequent.
10303	U.S.N.M.	2	D2039...	38 19 23 N.; 68 20 20 W..	2,369	....	glob. oz......	Rare.
10304	U.S.N.M.	2	D2042...	39 33 00 N.; 68 26 45 W..	1,555	38.5	glob. oz......	Rare.
10305	U.S.N.M.	2	D2105...	37 50 00 N.; 73 03 50 W..	1,395	41	glob. oz......	Rare.
10306	U.S.N.M.	7	D2111...	35 09 50 N.; 74 57 40 W..	938	....	gn. m........	Frequent.
10307	U.S.N.M.	2	D2115...	35 49 30 N.; 74 34 45 W..	843	39	m. fne. s.....	Rare.
10308	U.S.N.M.	1	D2150...	13 34 45 N.; 81 21 10 W..	382	45.75	wh. crs. s....	Rare.
10309	U.S.N.M.	3	D2189...	39 49 30 N.; 70 26 00 W..	600	39.7	gn. m. s......	Few.
10310	U.S.N.M.	3	D2202...	39 38 00 N.; 71 39 45 W..	515	39.1	gn. m........	Few.
10311	U.S.N.M.	3	D2203...	39 34 15 N.; 71 41 15 W..	705	38.9	gn. m. s......	Few.
10312	U.S.N.M.	5	D2204...	39 30 30 N.; 71 44 30 W..	728	39.1	br. m........	Few.
10313	U.S.N.M.	1	D2217...	39 47 20 N.; 69 34 15 W..	924	38.1	gy. m........	Rare.
10314	U.S.N.M.	1	D2231...	38 29 00 N.; 73 09 00 W..	965	36.8	gy. oz........	Rare.
10315	U.S.N.M.	1	D2384...	28 38 30 N.; 87 02 00 W..	420	41.8	gn. m........	Rare.
10316	U.S.N.M.	1	D2562...	39 15 30 N.; 71 25 00 W..	1,434	37.3	gy. oz........	Rare.
10317	U.S.N.M.	8	D2568...	39 15 00 N.; 68 08 00 W..	1,781	36.9	gy. oz........	Few.
10318	U.S.N.M.	4	D2572...	40 29 00 N.; 66 04 00 W..	1,769	37.8	gy. oz........	Few.
10319	U.S.N.M.	1	D2581...	39 43 00 N.; 71 34 00 W..	394	....	gn. m........	Rare.
10320	U.S.N.M.	2	D2677...	32 39 00 N.; 76 50 30 W..	478	39.3	gn. m........	Rare.
10321	U.S.N.M.	1	D2679...	32 40 00 N.; 76 40 30 W..	782	38.6	lt. gy. oz.....	Rare.
10322	U.S.N.M.	1	D2682...	39 38 00 N.; 70 22 00 W..	1,004	....	gn. m. s......	Rare.
10323	U.S.N.M.	1	D2689...	39 42 00 N.; 71 15 30 W..	525	....	gn. m........	Rare.
10324	U.S.N.M.	2	D2706...	41 28 30 N.; 65 35 30 W..	1,188	....	gy. oz. for...	Rare.
10325	U.S.N.M.	4	H179.....	14 20 30 N.; 63 10 00 W..	821	....	co. s. sh. for..	Few.
10326	U.S.N.M.	2	H185.....	12 58 40 N.; 62 48 00 W..	1,635	....	bu. m. for bk. sp.	Rare.

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[1] Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 106.

HAPLOPHRAGMOIDES ROTULATUM (H. B. Brady).

Plate 9, figs. 3 and 4.

Haplophragmium rotulatum H. B. Brady, Quart. Journ. Micr. Sci., vol. 21, 1881, p. 50: Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 306, pl. 34, figs. 5. 6.—Chapman, Proc. Zool. Soc. London, 1895, p. 16.—Egger, Abh. Bay. Akad. Wiss. München, vol. 18, 1893, p. 261, pl. 5, figs. 43, 44.

Haplophragmoides rotulatum Cushman, Bull. 71, U, S. Nat. Mus., pt. 1, 1910, p. 104, figs. 156–7.—Pearcey, Trans. Roy. Soc. Edinburgh, vol. 49, 1914, p. 1008.

Description.—Test planospiral, partially involute, composed of about three coils, biconcave, periphery thick, squarely or obliquely truncate, earlier coils somewhat exposed in the umbilical region; chambers numerous, about nine in the final coil, broad and low, not well defined from the exterior, sutures indistinct; wall fairly thick, roughened, composed of coarse sand grains; aperture a narrow slit at the base of the final chamber; color brown.

Diameter, 0.56–0.75 mm.

Distribution.—Brady gives several *Challenger* stations for this species in various parts of the Atlantic at depths ranging from 1,000 to 3,150 fathoms (1,829 to 5,761 meters). Pearcey records it from two *Scotia* stations in the South Atlantic in 1,946 and 2,110 fathoms (3,559 and 3,859 meters). I have had single specimens referable to this species, one from D2140, in 966 fathoms (1,767 meters) south of Jamaica, the other, D2761, in 818 fathoms (1,483 meters) off Brazil.

Haplophragmoides rotulatum—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
10 87	U.S.N.M.	1	D2140...	17 36 10 N.; 76 46 05 W..	966	39.7	s............	Rare.
10.88	U.S.N.M.	1	D2761...	15 39 00 S.; 38 32 54 W..	818	39	pter. oz.....	Rare.

HAPLOPHRAGMOIDES GLOMERATUM (H. B. Brady).

Plate 9, fig. 6.

Lituola glomerata H. B. Brady, Ann. Mag. Nat. Hist., ser. 5, vol. 1, 1878, p. 433, pl. 20, figs. 1*a*–*c*.

Haplophragmium glomeratum Wright, Proc. Belfast Field Club, 1880-81 (App.), p. 180, pl. 8, figs. 1, 1*a*.—H. B. Brady, Denkschr. Akad. Wiss. Wien, vol. 43, 1881, p. 100; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 309, pl. 34, figs. 15-18.—Balkwill and Millett, Journ. Micr., vol. 3, 1881, p. 25, pl. 1, fig. 6.—Balkwill and Wright, Trans. Roy. Irish Acad., vol. 28, 1885, p. 329.—J. Wright, Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 468.—Chapman, Journ. Roy. Micr. Soc., 1892, p. 321, pl. 5, fig. 8.—Goës, Köngl. Svensk. Vet. Akad. Handl., vol. 25, No. 9, 1894, p. 23, pl. 5, figs. 134-136 (not figs. 137-139).—Chapman, Proc. Zool. Soc. London, 1895, p. 15.—Heron-Allen and Earland, Proc. Roy. Irish Acad., vol. 31, pt. C4, 1913, p. 46, pl. 2, fig. 14; Trans. Linn. Soc. London, vol. 11, pt. 13, 1916, p. 225.

Haplophragmoides glomeratum Cushman, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 104, figs. 158-161.—Pearcey, Trans. Roy. Soc. Edinburgh, vol. 49, 1914, p. 1008.

Description.—Test small, planospiral, subglobose, composed of about two coils, chambers few, three or four in the last-formed coil, slightly concave at the umbilical region, very broad and low; wall coarsely arenaceous, thin, roughened on the exterior; aperture a short slit at the base of the chamber, often obscured by sand grains; color variable, depending largely upon the material of the test.

Diameter, 0.25–0.75 mm.

Distribution.—From published records this is a common species, yet I have failed to find it in material from the western Atlantic, nor is it recorded by Goës or Flint from the same region. The Atlantic records include Baffins Bay, Smith Sound, and Franz Josef Land at the north, off the coasts of Scotland and Ireland, and at numerous *Challenger* Atlantic stations, one of which at least is in the area from which many of the *Albatross* stations are located. Pearcey records it from the Antarctic.

HAPLOPHRAGMOIDES RUNIANUM (Heron-Allen and Earland).

Plate 10, figs. 1 and 2.

Haplophragmium runianum HERON-ALLEN and EARLAND, Trans. Linn. Soc. London, vol. 11, pt. 13, 1916, p. 224, pl. 40, figs. 15–18.

Description.—"Test free, nautiloid, more or less depressed at the umbilicus, constructed of rather coarse sand grains and gray cement. As a rule, no septation visible externally. In large specimens an occasional constriction indicates the presence of a suture. Marginal edge thick and rounded. Aperture simple, ranging between a fissure and a constricted terminal opening of irregular form. Viewed as an object in balsam, the multilocular character of the test becomes apparent; it is then seen to consist of three to four convolutions divided into numerous chambers (13 or 14 in the last convolution) by septal walls that are usually very thin in comparison with the thick outer wall of the test. The chambers are almost square in section."

"Diameter, 0.5–0.7 mm.; width of final convolution, 0.1; breadth of each chamber in final convolution, 0.1."

Distribution.—This species was described by the authors from a single station of the *Runa* from Scresort Bay, Rhum, off the west of Scotland, in 3 fathoms (5.5 meters).

The description and figures are from Heron-Allen and Earland.

HAPLOPHRAGMOIDES CORONATA (H. B. Brady).

Plate 9, fig. 1.

Trochammina coronata H. B. BRADY, Quart. Journ. Micr. Sci., vol. 19, 1879, p. 58, pl. 5, fig. 15; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 340, pl. 40, figs. 10–12.—FLINT, Rep. U. S. Nat. Mus., 1897 (1899), p. 281, pl. 26, fig. 3.

Haplophragmoides coronata CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 99, fig. 145–47.

Description.—Test planospiral, composed of three to six coils, outer ones somewhat embracing but not covering the whole of the previous coil; chambers usually six or seven in the last-formed coil, inflated, short, periphery lobulated, sutures depressed and distinct; wall arenaceous, composed of fine sand and a yellowish or reddish-brown cement; aperture simple, at the ventral border of the apertural face, sometimes with traces of a slightly developed lip; color usually yellowish or reddish brown, occasionally white.

Diameter, up to 2.5 mm.

Distribution.—This is a rare species, apparently with a definite distribution. The *Challenger* stations are three in number, 23 in 450 fathoms (823 meters) off Sombrero Island and 24 in 390 fathoms (713 meters) off Culebra Island, West Indies, and 120 in 675 fathoms (1,234 meters) off Pernambuco, Brazil. Flint records it from *Albatross* station D2395 in 347 fathoms (635 meters) in the northern part of the Gulf of Mexico, and his material which I have examined is typical. In the *Albatross* material I have had it has occurred at five stations, one off Central America, D2150, two in the eastern Caribbean, D2751 and H79 not far from the two *Challenger* stations and at two stations off Brazil, D2760 and D2761, slightly southward along the coast from the *Challenger* stations. This is very similar to the distribution of *Ammodiscoides turbinatus* and other species. It is apparently a definite faunal area for species in depths of 400–1,000 fathoms (732–1,829 meters) or a somewhat wider bathymetrical range. This is a large and striking species, well illustrated by Brady and by Flint and if it had a wider distribution it certainly would have been recorded elsewhere.

Haplophragmoides coronata—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		° F.		
10281	U.S.N.M.	1	D2150...	13 34 45 N.; 81 21 10 W..	382	45.75	wh. crs. s....	Rare.
10282	U.S.N.M.	7	D2751...	16 54 00 N.; 63 12 00 W..	687	40	bu. glob. oz..	Frequent.
10283	U.S.N.M.	3	D2760...	12 07 00 S.; 37 17 00 W..	1,019	39.5	br. co.......	Few.
10285	U.S.N.M.	1	D2761...	15 39 00 S.; 38 32 54 W...	818	39	pter. oz.....	Rare.
10286	U.S.N.M.	1	H79.....	14 20 30 N.; 63 10 00 W..	821	....	co. s. sh. for.	Rare.

HAPLOPHRAGMOIDES RINGENS (H. B. Brady).

Plate 9, fig. 2.

Trochammina ringens H. B. BRADY, Quart. Journ. Micr. Sci., vol. 19, 1879, p. 57, pl. 5, figs. 12*a*, *b*; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 343, pl. 40, figs. 17, 18.—GOËS, Bull. Mus. Comp. Zoöl., vol. 29, 1896, p. 33.—FLINT, Rep. U. S. Nat. Mus., 1897 (1899), p. 281, pl. 27, fig. 1.—MILLETT, Journ. Roy. Micr. Soc., 1899, p. 365, pl. 5, fig. 14 (?).—BAGG, Proc. U. S. Nat. Mus., vol. 34, 1908, p. 129.

Ammochilostoma ringens EIMER and FICKERT, Zeitschr. Wiss. Zool., vol. 65, 1899, p. 692.

Haplophragmoides ringens CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 107, fig. 166.

Description.—Test planospiral, of few coils, completely involute, compressed, periphery acute or very slightly rounded, somewhat lobulated; chambers distinct, few in number, three to five in the last-formed coil, the last in adults occasionally assuming peculiar forms, high, biconvex, sutures clearly marked but not greatly excavated; wall thin, of fine sand grains with an abundance of cement, smooth and polished; aperture an elongate, nearly straight, narrow slit, somewhat above the base of the chamber and usually in a slight depression; color a yellowish or reddish brown.

Diameter, up to 2.2 mm.

Distribution.—While this species has a wide distribution it is usually found in deep cold waters and usually is rare. In the Atlantic it has been found as far north as Davis Strait (Norman) and from several *Challenger* stations in the deeper Atlantic (Brady). Goës records it from the Gulf of Mexico and south of Cuba. Flint's specimens were from the northeastern coast of the United States and from the northern part of the Gulf of Mexico. From the *Albatross* material I have had *H. ringens* from 18 stations, mostly in deep water between 37° and 40° N. latitude, and 68° and 73° W. longitude. Five stations are in the northern part of the Gulf of Mexico and one from the eastern Caribbean.

The species is a very well marked one and can hardly be confused with any other. Its color, polished surface, general biconvex shape and especially in addition to these the peculiar aperture will distinguish it. The last-formed chamber in adults may be variously shaped as is shown in the figures. On the interior there is often a decidedly lipped condition about the aperture due to the bending in of the walls.

Haplophragmoides ringens—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
10263	U.S.N.M.	1	D2036...	38 52 40 N.; 69 24 40 W..	1,735	38	glob. oz.....	Rare.
10235	U.S.N.M.	6	D2038...	38 30 30 N.; 69 08 25 W..	2,033	....	glob. oz.....	Few.
10236	U.S.N.M.	5	D2039...	38 19 26 N.; 68 20 20 W..	2,369	....	glob. oz.....	Few.
10237	U.S.N.M.	7	D2041...	39 22 50 N.; 68 25 00 W..	1,608	38	glob. oz.....	Few.
10238	U.S.N.M.	10+	D2042...	39 33 00 N.; 68 26 45 W..	1,555	38.5	glob. oz.....	Common.
10239	U.S.N.M.	10+	D2043...	39 49 00 N.; 68 28 30 W..	1,467	38.5	glob. oz.....	Common.
10240	U.S.N.M.	1	D2046...	40 02 49 N.; 68 49 00 W..	407	40	bu. m.......	Rare.
10241	U.S.N.M.	2	D2097...	37 56 20 N.; 70 57 30 W..	1,917	....	glob. oz.....	Rare.
10242	U.S.N.M.	1	D2221...	39 05 30 N.; 70 44 30 W..	1,525	36.9	gy. oz.......	Rare.
10243	U.S.N.M.	1	D2226...	37 00 00 N.; 71 54 00 W..	2,045	36.8	glob. oz.....	Rare.
10244	U.S.N.M.	4	D2228...	37 25 00 N.; 73 06 00 W..	1.582	36.8	br. m.......	Few.
10245	U.S.N.M.	1	D2372...	29 15 30 N.; 85 29 30 W..	27	....	g............	Rare.
10246	U.S.N.M.	10+	D2383...	28 32 00 N.; 88 06 00 W..	1,181	39.8	br. gn. m....	Common.
10247	U.S.N.M.	5	D2385...	28 51 00 N.; 88 18 00 W..	730	40.1	gy. m.......	Few.
10248	U.S.N.M.	2	D2392...	28 47 30 N.; 87 27 00 W..	724	40.7	br. gy. m....	Rare.
10249	U.S.N.M.	1	D2393...	28 43 00 N.; 87 14 30 W..	525	41.1	lt. gy. m....	Rare.
10250	U.S.N.M.	2	D2568...	39 15 00 N.; 68 08 00 W..	1,781	36.9	gy. oz.......	Rare.
10251	U.S.N.M.	1	H79.....	14 29 30 N.; 63 10 00 W..	821	....	co. s.sh. for..	Rare.

Genus CRIBROSTOMOIDES Cushman, 1910.

Haplophragmium H. B. Brady (part), Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 307.

Cribrostomoides Cushman, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 108, fig. 167*a*, *b*. (Type, *Cribrostomoides bradyi* Cushman).

Description.—Test free, planospiral, composed of numerous chambers in several coils, the last-formed coil with several chambers progressively increasing in size, wall arenaceous, with much cement usually of a light brown color, aperture in young specimens a simple elongate slit at the base of the apertural face, later subdivided by tooth-like processes, and in the adult represented by a linear series of distinct rounded openings.

This genus, while in general character is similar to *Haplophragmoides*, differs very distinctly in the apertural characters and in their development.

CRIBROSTOMOIDES BRADYI Cushman.

Plate 10, fig. 3.

Haplophragmium latidorsatum H. B. Brady (part) (not Bornemann), Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 307, pl. 34, fig. 9.—Goës, Bull. Mus. Comp. Zoöl., vol. 29, 1896, p. 29 (part).

Cribrostomoides bradyi Cushman, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 108, figs. 167*a*, *b*.—Pearcey, Trans. Roy. Soc. Edinburgh, vol. 49, 1914, p. 1009.

Description.—Test large, planospiral, or the last-formed coil slightly oblique; periphery broadly rounded, very slightly if at all lobulated, usually completely involute, umbilicate, chambers numerous, seven to nine in the last-formed coil, low and broad, sutures distinct; wall arenaceous, smoothly finished, aperture in the young a simple slit at the base of the chamber, in later stages becoming interrupted by ingrowing, tooth-like projections which later meet and form a linear series of rounded openings in the adult; color grayish or yellowish brown.

Diameter, up to 3 mm.

Distribution.—As this genus and species was not segregated until 1910, its distribution largely depends upon records from that time. It has been recorded from the Pacific in various areas (Cushman) and from the South Atlantic and Antarctic (Pearcey). In the *Albatross* material it occurs off the northeastern United States at many stations in cold water and at a few in the Gulf of Mexico and Caribbean. Specimens were noted in one lot of *Goldseeker* material from off the British Isles. Adult specimens are easily distinguished, and younger specimens have the peculiar aperture and smooth exterior.

Cribrostomoides bradyi—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°*F.*		
10358	U.S.N.M.	8	D2018...	37 12 22 N.; 74 20 04 W..	788	39	bu. m.......	Frequent.
10359	U.S.N.M.	10+	D2035...	39 26 16 N.; 70 02 37 W..	1,362	....	glob. oz.....	Common.
10360	U.S.N.M.	3	D2036...	38 52 40 N.; 69 24 40 W..	1,735	38	glob. oz.....	Few.
10361	U.S.N.M.	8	D2037...	38 53 00 N.; 69 23 30 W..	1,731	38	glob. oz.....	Frequent.
10362	U.S.N.M.	10+	D2038...	38 30 30 N.; 69 08 25 W..	2,033	....	glob. oz.....	Common.
10363	U.S.N.M.	10+	D2039...	38 19 26 N.; 68 20 20 W..	2,369	....	glob. oz.....	Common.
10364	U.S.N.M.	10+	D2041...	39 22 50 N.; 68 25 00 W..	1,608	38	glob. oz.....	Common.
10365	U.S.N.M.	6	D2042...	39 33 00 N.; 68 26 45 W..	1,555	38.5	glob. oz.....	Few.
10366	U.S.N.M.	10	D2043...	39 49 00 N.; 68 28 30 W..	1,467	38.5	glob. oz.....	Frequent.
10367	U.S.N.M.	2	D2046...	40 02 49 N.; 68 49 00 W..	407	40	bu. m.......	Few.
10368	U.S.N.M.	1	D2096...	39 22 20 N.; 70 52 20 W..	1,451	37.5	glob. oz.....	Rare.
10369	U.S.N.M.	3	D2097...	37 56 20 N.; 70 57 30 W..	1,917	....	glob. oz.....	Few.
10370	U.S.N.M.	1	D2105...	37 50 00 N.; 73 03 50 W..	1,395	41	glob. oz.....	Rare.
3101	U.S.N.M.	1	D2174...	38 15 00 N.; 72 03 00 W..	1,594	....	gy. m.......	Rare.
10371	U.S.N.M.	9	D2221...	39 05 30 N.; 70 44 30 W..	1,525	36.9	gy. oz.......	Frequent.
10372	U.S.N.M.	1	D2222...	39 03 15 N.; 70 50 45 W..	1,537	36.9	gy. oz.......	Rare.
10373	U.S.N.M.	5	D2226...	37 00 00 N.; 71 54 00 W..	2,045	36.8	glob. oz.....	Few.
10374	U.S.N.M.	1	D2228...	37 25 00 N.; 73 06 00 W..	1,582	36.8	br. m.......	Rare.
10375	U.S.N.M.	10+	D2377...	29 07 30 N.; 88 08 00 W..	210	67	gy. m.......	Common.
10376	U.S.N.M.	1	D2381...	28 05 00 N.; 87 56 15 W..	1,330	....	lt. br. m....	Rare.
10377	U.S.N.M.	10+	D2383...	28 32 00 N.; 88 06 00 W..	1,181	39.8	br. gn. m. ..	Common.
10378	U.S.N.M.	10+	D2385...	28 51 00 N.; 88 18 00 W..	730	40.1	gy. m.......	Common.
10379	U.S.N.M.	3	D2399...	28 44 00 N.; 88 18 00 W..	196	51.6	gy. m.......	Few.
10380	U.S.N.M.	2	D2505...	44 23 30 N.; 61 44 15 W..	93	42.3	dk. br. m...	Few.
10381	U.S.N.M.	1	D2550...	39 44 30 N.; 70 30 45 W..	1,081	38.5	br. m.......	Rare.
10382	U.S.N.M.	6	D2562...	39 15 30 N.; 71 25 00 W..	1,434	37.3	gy. oz.......	Few.
10383	U.S.N.M.	10+	D2572...	40 29 00 N.; 66 04 00 W..	1,769	37.8	gy. oz.......	Common.
10384	U.S.N.M.	1	D2716...	38 29 30 N.; 70 57 00 W..	1,031	....	br. oz. for...	Rare.
10385	U.S.N.M.	3	D2751...	16 54 00 N.; 63 12 00 W..	687	40	bu. glob. oz.	Rare.
10386	U.S.N.M.	10+.	*Goldseeker.*	61 03 00 N.; 2 20 00 W..	....	....	....	

Genus CYCLAMMINA H. B. Brady, 1876.

Lituola W. B. Carpenter (part), The Microscope, ed. 5, 1875, p. 536.—Carter, Ann. Mag. Nat. Hist., ser. 4, vol. 19, 1877, p. 203.

Cyclammina H. B. Brady (MS.) in Norman, Proc. Roy. Soc., vol. 25, 1876, p. 214 (Type, *Cyclammina cancellata* H. B. Brady); Rep. Voy. *Challenger*. Zoology, vol. 9, 1884, p. 350.—Chapman, The Foraminifera, 1902, p. 158.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 109.

Description.—Test free, planospiral, composed of numerous chambers in a close-coiled nautiloid series, final volution usually embracing the preceding ones except at the umbilicus; walls thick, composed of fine arenaceous material with a large amount of reddish-brown cement, exterior smooth, chambers with secondary labyrinthic structures interiorly, especially on the peripheral portion of each chamber, early chambers often becoming completely filled by this secondary growth; aperture a curved fissure at the proximal portion of the apertural face, supplemented by numerous pores in the central portion of the apertural wall.

CYCLAMMINA CANCELLATA H. B. Brady.

Plate 10. figs. 4 and 5.

"Nautiloid *Lituola*" W. B. CARPENTER, The Microscope, ed. 5, 1875. p. 536, figs. 274*a*, *b*, *c* (in text).

Cyclammina cancellata H. B. BRADY (MS.) in Norman, Proc. Roy. Soc., vol. 25, 1876, p. 214; Quart. Journ. Micr. Sci., vol. 19, 1879, p. 62; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884. p. 351. pl. 37. figs. 8-16.—AGASSIZ. Bull. Mus. Comp. Zoöl., vol. 20, 1888, p. 164, figs. 498. 499 (in text).—J. WRIGHT. Proc. Roy. Irish Acad., ser. 3, vol. 1. 1891, p. 470.—CHAPMAN, Proc. Zool. Soc. London. 1895, p. 18.—GOËS, Bull. Mus. Comp. Zoöl., vol. 29, 1896. p. 32.—FLINT, Rep. U. S. Nat. Mus., 1897 (1899). p. 282, pl. 27, fig. 3; pl. 28. fig. 1.—CHAPMAN, The Foraminifera. 1902. p. 158, pl. 8, figs. *N*, *n*.—BAGG, Proc. U. S. Nat. Mus., vol. 34, 1908, p. 129.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 1, 1910. p. 110. figs. 168-171.—PEARCEY. Trans. Roy Soc. Edinburgh, vol. 49, 1914. p. 1009.

Lituola canariensis CARTER Ann. Mag. Nat. Hist., ser. 4, vol. 19, 1877, p. 203, pl. 13, figs. 26-29.

Description.—Test large, compressed, planospiral, composed of two or three coils, periphery broadly rounded, smooth or very slightly lobulated, somewhat depressed in the umbilical region; chambers numerous, usually fifteen or more in the last-formed coil, sutures distinct, but not depressed, sigmoid, interior labyrinthic, especially the peripheral portion, the interior of each chamber having a larger cavity; wall arenaceous, with an excess of yellowish or reddish brown cement often with fairly large angular sand grains but these smoothly finished into the surface which has often a dull gloss; aperture an elongated curved slit at the base of the chamber with supplementary circular pores in the face of the chamber, variously arranged, often numerous in the larger specimens; color yellowish or reddish-brown or gray.

Diameter up to 6.5 mm.

Distribution.—This is a widely distributed species. The various species previously included under this name have been separated and need data of their distribution. In the *Albatross* material *C. cancellata* occurs abundantly off the eastern coast of the United States, in the Gulf of Mexico, Caribbean Sea, and off the coast of Brazil. All but two of the twenty-nine stations are in less than 1,000 fathoms (1,829 meters) and the other two are not greatly in excess of this depth. This is not necessarily significant except that the two allied species *C. compressa* and *C. pauciloculata* occur at greater average depths in the same general area.

C. cancellata may be distinguished from the others by its larger size but especially by its broadly rounded periphery with numerous chambers, usually fifteen or more in the last-formed coil.

Cyclammina cancellata—*material examined.*

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temparature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		° F.		
10435	U.S.N.M.	1	D2150	13 34 45 N.; 81 21 10 W.	382	45.75	wh. crs. s.	Rare.
10436	U.S.N.M.	1	D2172	38 01 15 N.; 73 44 00 W.	568	39	gn. m.	Rare.
10437	U.S.N.M.	5	D2202	39 38 00 N.; 71 39 45 W.	515	39.1	gn. m.	Few.
10438	U.S.N.M.	6	D2203	39 34 15 N.; 71 45 15 W.	705	38.9	gn. m. s.	Few.
10439	U.S.N.M.	2	D2204	39 30 30 N.; 71 44 30 W.	728	39.1	br. m.	Rare.
10440	U.S.N.M.	3	D2212	39 59 30 N.; 70 30 45 W.	428	40	gn. m.	Few.
10441	U.S.N.M.	5	D2213	39 58 30 N.; 70 30 00 W.	384	39.5	gn. m.	Few.
10442	U.S.N.M.	10+	D2234	39 09 00 N.; 72 03 15 W.	810	38.6	gn. m.	Common.
10443	U.S.N.M.	5	D2237	39 12 17 N.; 72 09 30 W.	520	39.5	gn. m.	Few.
10444	U.S.N.M.	1	D2314	32 43 00 N.; 77 51 00 W.	159	47.4	crs. s. brk. sh	Rare.
10445	U.S.N.M.	1	D2355	20 56 48 N.; 86 27 00 W.	399	....	yl. oz.	Rare.
10446	U.S.N.M.	10+	D2385	28 51 00 N.; 88 18 00 W.	730	40.1	gy. m.	Common.
10447	U.S.N.M.	2	D2392	28 47 30 N.; 87 27 00 W.	724	40.7	br. gy. m.	Rare.
10448	U.S.N.M.	3	D2394	28 38 30 N.; 87 02 00 W.	420	41.8	gn. m.	Rare.
10449	U.S.N.M.	2	D2395	28 36 15 N.; 86 50 00 W.	347	44.1	gy m.	Rare.
10450	U.S.N.M.	4	D2504	44 23 00 N.; 61 22 45 W.	82	40.6	bk. m. g.	Few.
10451	U.S.N.M.	10+	D2677	32 39 00 N.; 76 50 30 W.	478	39.3	gn. m.	Common.
10452	U.S.N.M.	3	D2678	32 40 00 N.; 76 40 30 W.	731	38.7	lt. gy. oz.	Few.
10453	U.S.N.M.	6	D2679	32 40 00 N.; 76 40 30 W.	782	38.6	lt. gy. oz.	Few.
10454	U.S.N.M.	3	D2680	39 50 00 N.; 70 26 00 W.	555	....	....	Few.
10455	U.S.N.M.	10+	D2689	39 42 00 N.; 71 15 30 W.	525	....	gn. m.	Common.
10456	U.S.N.M.	1	D2729	36 36 00 N.; 74 32 00 W.	679	....	dk. gn. m.	Rare.
10457	U.S.N.M.	2	D2731	36 45 00 N.; 74 28 00 W.	781	....	gy. oz.	Rare.
10458	U.S.N.M.	10+	D2739	37 34 30 N.; 73 58 00 W.	811	38.2	gy. m.	Common.
10459	U.S.N.M.	10	D2751	16 54 00 N.; 63 12 00 W.	687	40	bu. glob. oz.	Common.
10460	U.S.N.M.	10+	D2760	12 07 00 S.; 37 17 00 W.	1,019	39.5	br. co.	Common.
10461	U.S.N.M.	1	D2761	15 39 00 S.; 38 32 54 W.	818	39	pter. oz.	Rare.
10462	U.S.N.M.	1	H58	17 45 20 N.; 65 35 35 W.	1,345	....	oz. for.	Rare.
10463	U.S.N.M.	1	H405	18 43 00 N.; 83 36 45 W.	735	....	yl.oz.for.pter	Rare.

CYCLAMMINA COMPRESSA Cushman.

Plate 11, fig. 1.

Cyclammina cancellata (part) Cushman, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 111, fig. 171 (not figures 168–170).

Cyclammina compressa Cushman, Proc. U. S. Nat. Mus., vol. 51, 1917, p. 653.

Description.—Test nautiloid, biconvex, compressed, peripheral margin subacute, umbilicus often notably excavated; chambers numerous, 14–16 in the last-formed coil, usually 15; sutures subangular in the middle in side view, clearly depressed; surface smooth when perfect; aperture and color as in *C. cancellata.*

Diameter, up to 3.5 mm.

Distribution.—This species, originally described from 560 fathoms off the Philippines, seems, like other species of the genus, to be widely distributed. Specimens have occurred at numerous stations in the region from Cape Hatteras northward to the Georges Banks with a few stations in the eastern portion of the Caribbean Sea. The range in depth is from 328 to 1,635 fathoms (600–2,990 meters) and bottom temperatures where given 36.9° to 40.2° F. (2.7 to 4.5° C.). The stations at which it occurred in considerable numbers are between 500 and 1,000 fathoms (914 and 1,829 meters).

This seems to be easily distinguished from typical *C. cancellata*, as its shape, periphery, umbilicate region, with exposed previous coils, are very distinct from that species. Its nearest related species is the much smaller *C. pusilla* but that is very much smaller.

Cyclammina compressa—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		° F.		
10387	U.S.N.M.	10+	D2110...	35 12 10 N.; 74 57 15 W..	516	40	bu. m.......	Common.
10388	U.S.N.M.	10+	D2111...	35 09 50 N.; 74 57 40 W..	938	....	gn. m.......	Common.
10389	U.S.N.M.	10+	D2115...	35 49 30 N.; 74 34 45 W..	843	39	m. fne. s....	Common.
10390	U.S.N.M.	1	D2187...	39 49 30 N.; 71 10 00 W..	420	39.7	gn. m. s.....	Rare.
10391	U.S.N.M.	10+	D2189...	39 49 30 N.; 70 26 00 W..	600	39.7	gn. m. s.....	Common.
10392	U.S.N.M.	10+	D2202...	39 38 00 N.; 71 39 45 W..	515	39.1	gn. m.......	Common.
10393	U.S.N.M.	10+	D2203...	39 34 15 N.; 71 45 15 W..	705	38.9	gn. m. s.....	Common.
10394	U.S.N.M.	10+	D2204...	39 30 30 N.; 71 44 30 W..	728	39.1	br. m.......	Common.
10395	U.S.N.M.	4	D2213...	39 58 30 N.; 70 30 00 W..	384	39.5	gn. m.......	Few.
10396	U.S.N.M.	2	D2221...	39 05 30 N.; 70 44 30 W..	1,525	36.9	gy. oz.......	Rare.
10397	U.S.N.M.	1	D2531...	40 42 00 N.; 66 33 00 W..	852	38.4	gy. m.......	Rare.
10398	U.S.N.M.	1	D2562...	39 15 30 N.; 71 25 00 W..	1,434	37.3	gy. oz.......	Rare.
10399	U.S.N.M.	1	D2584...	39 05 30 N.; 72 23 20 W..	541	39.5	gy. m.......	Rare.
10400	U.S.N.M.	2	D2586...	39 02 40 N.; 72 40 00 W..	328	40.2	dk. gy. m...	Rare.
10401	U.S.N.M.	2	D2682...	39 38 00 N.; 70 22 00 W..	1,004	....	gn. m. s.....	Rare.
10402	U.S.N.M.	4	D2706...	41 28 30 N.; 65 35 30 W..	1,188	....	gy. oz. for...	Few.
10403	U.S.N.M.	4	D2710...	40 06 00 N.; 68 01 30 W..	984	....	gn. m.......	Few.
10404	U.S.N.M.	1	H79.....	14 20 30 N.; 63 10 00 W..	821	....	co. s. sh. for.	Rare.
10405	U.S.N.M.	3	H80.....	13 56 35 N.; 63 02 00 W..	684	....	gy. m for..	Rare.
10406	U.S.N.M.	2	H86.....	12 58 40 N.; 62 48 00 W..	1,635	....	bu. m. for. bk. sp.	Rare.

CYCLAMMINA PAUCILOCULATA Cushman.

Plate 11, fig. 2.

Cyclammina pauciloculata Cushman, Proc. U. S. Nat. Mus., vol. 51, 1917, p. 653.

Description.—Test compressed, nautiloid, biconvex, peripheral margin bluntly rounded, umbilical region depressed, chambers typically ten to eleven in the last-formed coil, sutures nearly straight to somewhat curved; surface smooth when perfect; supplementary apertural pores few in number.

Diameter, up to 2.5 mm.

Distribution.—This species is widely distributed. Originally described from the Philippine region where it is widely distributed, especially in the deeper cooler waters it has been found in considerable numbers in the western Atlantic. Specimens are numerous from the northeastern coast of the United States, from the Gulf of Mexico, and less common from the Caribbean Sea.

This species holds a somewhat intermediate position between *C. cancellata* and *C. compressa* and is easily distinguished from either by the smaller size and smaller number of chambers in the last-formed coil at any stage of development.

Cyclammina pauciloculata—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
10407	U.S.N.M.	10+	D2003.....	37 16 30 N.; 74 20 36 W..	641	....	....	Common.
10408	U.S.N.M.	10+	D2018.....	37 12 22 N.; 74 20 04 W..	788	39	bu. m.......	Common.
10409	U.S.N.M.	1	D2035.....	39 26 16 N.; 70 02 37 W..	1,362	....	glob. oz.....	Rare.
10430	U.S.N.M.	1	D2041.....	39 22 50 N.; 68 25 00 W..	1,608	38	glob. oz.....	Rare.
10410	U.S.N.M.	3	D2043.....	39 49 00 N.; 68 28 30 W..	1,467	38.5	glob. oz.....	Rare.
10411	U.S.N.M.	1	D2046.....	40 02 49 N.; 68 49 00 W..	407	40	bu. m.......	Rare.
10412	U.S.N.M.	1	D2048.....	40 02 00 N.; 68 50 30 W..	547	29	crs. s. m. & g.	Rare.
10413	U.S.N.M.	2	D2052.....	39 40 05 N.; 69 21 25 W..	1,098	45	glob. oz.....	Rare.
10414	U.S.N.M.	10+	D2150.....	13 34 45 N.; 81 21 10 W..	382	45.75	wh. crs. s....	Common.
10415	U.S.N.M.	4	D2171.....	37 59 30 N.; 73 48 40 W..	444	39.5	gn. m.......	Few.
10416	U.S.N.M.	1	D2204.....	39 30 30 N.; 71 44 30 W..	728	39.1	br. m.......	Rare.
10417	U.S.N.M.	10+	D2219.....	39 46 22 N.; 69 29 00 W..	948	38.8	gy. m.......	Common.
10431	U.S.N.M.	1	D2222.....	39 03 15 N.; 70 50 45 W..	1,537	36.9	gy. oz.......	Rare.
10418	U.S.N.M.	10+	D2377.....	29 07 30 N.; 88 08 00 W..	210	67	gy. m.......	Common.
10419	U.S.N.M.	6	D2381.....	28 05 00 N.; 87 56 15 W..	1,330	....	lt. br. m.....	Few.
10420	U.S.N.M.	7	D2383.....	28 32 00 N.; 88 06 00 W..	1,181	39.8	br. gn. m....	Few.
10421	U.S.N.M.	10+	D2393.....	28 43 00 N.; 87 14 30 W..	525	41.1	lt. gy. m....	Common.
10422	U.S.N.M.	8	D2399.....	28 44 00 N.; 86 18 00 W..	196	51.6	gy. m.......	Few.
10423	U.S.N.M.	4	D2547.....	39 54 30 N.; 70 20 00 W..	390	39.6	gn. m.......	Few.
10424	U.S.N.M.	10	D2550.....	39 44 30 N.; 70 30 45 W..	1,081	38.5	br. m.......	Common.
10425	U.S.N.M.	5	D2552.....	39 47 07 N.; 70 35 00 W..	721	39.6	gy. oz.......	Few.
10426	U.S.N.M.	5	D2581.....	39 43 00 N.; 71 34 00 W..	394	....	gn. m.......	Few.
10427	U.S.N.M.	2	D2586.....	39 02 40 N.; 72 40 00 W..	328	40.2	dk. gy. m...	Rare.
10428	U.S.N.M.	2	H88.......	12 29 00 N.; 62 38 30 W..	1,630	....	m. bk. sp. for.	Rare.
10429	U.S.N.M.	2	*Fish Hawk* 869.	02 18 N.; 70 23 06 W..	192	50	fne. s........	Rare.

CYCLAMMINA PUSILLA H. B. Brady.

Plate 11, figs. 4–6.

Cyclammina pusilla H. B. Brady, Quart. Journ. Micr. Sci., vol. 21, 1881, p. 53.—Goës, Köngl. Svensk. Vet. Akad. Handl., vol. 25, No. 9, 1894, p. 32, pl. 6, figs. 242–244.—Chapman, Proc. Zool. Soc. London, 1895, p. 18.—Goës, Bull. Mus. Comp. Zoöl., vol. 29, 1896, p. 32.—Flint, Rep. U. S. Nat. Mus., 1897 (1899), p. 282, pl. 28, fig. 2.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 111, fig. 172.—Pearcey, Trans. Roy. Soc. Edinburgh, vol. 49, 1914, p. 1009.

Description.—Test small, compressed, planospiral, periphery sharply angled, slightly lobulated, consisting of about three coils, involute, but not completely so, the previous coil slightly exposed in the umbilical region; chambers numerous, about 15 in the last-formed coil, triangular in face view, sutures slightly sigmoid, distinct, slightly depressed; wall arenaceous, porous within and showing a tendency to become labyrinthic, surface smooth; aperture a curved slit at the base of the apertural face; color reddish brown.

Diameter, 0.5–1.5 mm.

Distribution.—Brady records this species from but two *Challenger* stations, one, 323, east of Buenos Aires, in 1,900 fathoms (3,475 meters), the other, 153, off the Antarctic Ice Barrier, in 1,675 fathoms (3,063 meters). It is later recorded from *Challenger* stations 24, off Culebra Island, West Indies, in 390 fathoms (713 meters), and 85, off the Canaries, in 1,125 fathoms (2,057 meters). Goës records it at numerous stations in the Caribbean Sea, but there are no specimens in his collection as far as I have seen. However, from *Albatross* station, D2394, there are numerous small specimens in the Goës collection with a typical *C. cancellata*, which ought to be referred to *C. pusilla*, but all are mounted together and labeled *C. cancellata* by Goës. Pearcey records it from numerous *Scotia* stations in the South Atlantic and Antarctic.

In the *Albatross* material from the Atlantic I have not found the species, all those smaller specimens being referred to *C. compressa*, as they are as a rule too large for typical *C. pusilla* and more definitely like *C. compressa.*

There is a possibility of *C. pusilla* being the young of the species of which *C. compressa* is the adult, but large specimens are not mentioned from the southern regions where *C. pusilla* seems to be most characteristic, and in the Pacific material that I have seen they are not as a rule found together.

CYCLAMMINA ORBICULARIS H. B. Brady.

Plate 11, figs. 7-9.

Cyclammina orbicularis H. B. Brady, Quart. Journ. Micr. Sci., vol. 21, 1881, p. 58; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 353, pl. 37, figs. 17-19.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 113, figs. 173*a*, *b*.

Description.—Test subglobose, planospiral, as broad as high, composed of usually less than two complete coils, surface smooth, glossy, involute, chambers 11-12 in the last-formed coil, much broader than high, oblique in side view and triangular, sutures distinct and somewhat depressed; wall of sand grains with abundant cement; aperture a long, narrow, curved slit at the base of the apertural face of the chamber, simple; color various shades of gray and brown.

Diameter, 1.5-2 mm.

Distribution.—The only record for the Atlantic seems to be that of the *Challenger* station 323, in 1,900 fathoms (3,475 meters), east of Buenos Aires. I have not found it in the *Albatross* material. The other records are *Challenger* station 153, off the Antarctic Ice barrier, 1,675 fathoms (3,063 meters), and station 168, east coast of New Zealand, 1,100 fathoms (2,012 meters) (Brady), west coast of Mexico, *Albatross* D3419, in 772 fathoms (1,412 meters) (Goës, Cushman), and a questionable specimen off Japan.

CYCLAMMINA BRADYI Cushman.

Plate 11, fig. 3.

Trochammina trullissata H. B. Brady (part), Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 342, pl. 40, fig. 13 (not 14, 15).

Cyclammina bradyi Cushman, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 113, figs. 174*a*, *b*.

Description.—Test planospiral, nearly completely involute, slightly umbilicate, compressed, periphery bluntly angled, very slightly lobulated, chambers six to nine in the last coil, high and narrow, generally triangular in front view, sutures distinct, slightly sigmoid, wall of fine sand grains with an excess of yellowish or reddish brown cement smooth and glossy; aperture crescentiform, at the base of the apertural face, between the base of the wall and the previous volution, in adult specimens occasionally with a few circular perforations on the apertural face of the last-formed chamber; color yellowish or reddish brown.

Diameter, 1–1.5 mm.

Distribution.—As this species is a segregation from *Haplophragmoides trullissata* it is impossible without an examination of specimens to say which of the older records belong to this or the other species. In the Pacific single specimens were found at two stations, and in the *Albatross* Atlantic material single specimens were found at three stations, one off the northeastern coast of the United States and the other two in the Caribbean. They are very typical, so the species evidently has a wide distribution in cold waters and usually at considerable depths.

Cyclammina bradyi—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
10132	U.S.N.M.	1	D2542...	40 00 15 N.; 70 42 20 W..	129	47.2	s. brk. sh....	Rare.
10133	U.S.N.M.	1	H80.....	13 56 35 N.; 63 02 00 W..	684	....	gy. m. for....	Rare.
10134	U.S.N.M.	1	H86.....	12 58 40 N.; 62 48 00 W..	1,635	....	bu. m. for. bk. sp.	Rare.

Genus LITUOTUBA Rhumbler, 1895.

Trochammina (part) H. B. Brady, Quart. Journ. Micr. Sci., vol. 19, 1879, p. 59; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 342.—Chapman, The Foraminifera, 1902, p. 151.

Lituotuba Rhumbler, Nachr. Köngl. Ges. Wiss. Göttingen, 1895, p. 83.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 113. (Type, *L. lituiformis* (H. B. Brady)=*Trochammina lituiformis* H. B. Brady.)

Description.—Test of two distinct parts, an early close-coiled portion and a long tubular uncoiled later portion; wall arenaceous, with an excess of cement, either indistinctly or irregularly divided.

This genus seems related, on the one hand, to *Ammodiscus* through such a form as *Trochamminoides proteus* (Karrer), but shows a definite senescent character in its uncoiled form. Besides certain fossil species this genus includes the following recent species:

LITUOTUBA LITUIFORMIS (H. B. Brady).

Plate 12, figs. 1 and 2.

Trochammina lituiformis H. B. BRADY, Quart. Journ. Micr. Soc., vol. 19, 1879, p. 59, pl. 5, fig. 16; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 342, pl. 40, figs. 4-7.—FLINT, Rep. U. S. Nat. Mus., 1897 (1899), p. 281, pl. 26, fig. 1.—CHAPMAN, The Foraminifera, 1902, p. 151, pl. 8, fig. *E*.—BAGG, Proc. U. S. Nat. Mus., vol. 34, 1908, p. 128.

Lituotuba lituiformis RHUMBLER, Nachr. Köngl. Ges. Wiss. Göttingen, 1895, p. 84; Arch. Prot., vol. 3, 1903, p. 279, fig. 128*a*, *b*.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 114, fig. 175.

Description.—Test composed of a close-coiled early portion and a later uncoiled portion, straight and tubular but divided into chambers; chambers numerous, often somewhat indistinctly marked, of unequal length but of fairly uniform diameter; wall arenaceous with an excess of cement, surface smooth; aperture rounded, at the end of the tubular portion, in perfect specimens somewhat contracted from the normal diameter of the tubular chamber; color yellowish brown.

Length up to 5 mm.

Distribution.—This is rather a rare species recorded by Brady in the *Challenger* report from but three stations, all in the Atlantic; station 24, off Culebra Island, West Indies, in 390 fathoms (713 meters); station 76, off the Azores, in 900 fathoms (1,646 meters), and station 120, off Pernambuco, Brazil, in 675 fathoms (1,234 meters). Goës combines *Trochamminoides proteus* and this species, so his records are not available, except *Albatross* H215, from which there is material in the Goës collection. Flint's material was from two *Albatross* stations in the northern part of the Gulf of Mexico, D2394 and D2395 in 420 and 347 fathoms (768 and 635 meters), off the west coast of Cuba, D2352 in 463 fathoms (847 meters) and off Bahia, Brazil, D2760 in 1,019 fathoms (1,864 meters). The *Albatross* material I have had has been from the northern part of the Gulf of Mexico and from both the eastern and western Carribbean.

Lituotuba lituiformis—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature,	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
10164	U.S.N.M.	1	D2385...	28 51 00 N.; 88 18 00 W..	730	40.1	gy. m.......	Rare.
10165	U.S.N.M.	1	D2398...	28 45 00 N.; 86 26 00 W..	227	48.6	gy. m.......	Rare.
10166	U.S.N.M.	1	H49.....	17 37 30 N.; 65 15 00 W..	928	....	oz. for.......	Rare.
10167	U.S.N.M.	1	H80.....	13 56 35 N.; 63 02 00 W..	684	....	gy. m. for....	Rare.
10168	U.S.N.M.	2	H82.....	13 29 00 N.; 62 42 40 W..	1,051	....	for. m. bk. sp.	Rare.
10169	U.S.N.M.	1	H86.....	12 58 40 N.; 62 48 00 W..	1,635	....	bu. m. for. bk. sp.	Rare.
10170	U.S.N.M.	1	H88.....	12 29 00 N.; 62 38 30 W..	1,630	....	m. bk.sp.for.	Rare.
		1	H89.....	12 07 30 N.; 62 24 00 W..	1,552	....	bu. m. for..	Rare.
10471	U.S.N.M.	4	H215....	18 54 30 N.; 75 16 30 W..	1,486	....	yl. m. brk. sh. for.	Few.
10172	U.S.N.M.	6	H405....	18 43 00 N.; 83 36 45 W..	735	....	yl. oz. for. pter.	Few.

Genus AMMOBACULITES Cushman, 1910.

Spirolina (part) d'Orbigny, For. Foss. Bass. Tert. Vienne, 1846, p. 137.

Haplophragmium (part) H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 301.—Chapman, The Foraminifera, 1902, p. 138.

Ammobaculites Cushman, Bull. U. S. Nat. Mus., pt. 1, 1910, p. 114. (Type, *Ammobaculites agglutinans* (d'Orbigny).)

Description.—Test free, composed of several chambers, early portion close coiled in a single plane, later portion uncoiled and made up of a more or less linear series of chambers; wall coarsely arenaceous, usually rather thick; aperture single at the distal end of the last-formed chamber in the adult uncoiled specimen, but in the young usually at the base of the apertural face.

This genus is distinguished from the typical *Haplophragmium* of Reuss by lacking the multiple apertures and labyrinthic chambers of that genus. Both have the uncoiled later development. The true *Haplophragmium* is rather rare in the present oceans, but the species have the character of multiple apertures. The name *Haplophragmium* has been applied to coiled and uncoiled forms, trochoid and irregularly formed specimens, but these are here divided structurally into several genera.

AMMOBACULITES AGGLUTINANS (d'Orbigny).

Plate 12, fig. 3.

Spirolina agglutinans d'Orbigny, For. Foss. Bass. Tert. Vienne, 1846, p. 137, pl. 7, figs. 10–12.

Haplophragmium agglutinans H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol 9, 1884, p. 301, pl. 32, figs. 19, 20, 24–26.—Haeusler, Neues Jahrb., Beil vol. 4, 1885, p. 13, pl. 1, figs. 22, 23; pl. 2, figs. 3, 4.—Balkwill and Wright, Trans. Roy. Irish Acad., vol. 28, 1885, p. 330, pl. 13, figs. 18–20.—Sherborn and Chapman, Journ. Roy. Micr. Soc., 1889, p. 484, pl. 11, fig. 8.—Haeusler, Abh. Schweiz. Pal. Ges., vol. 17, 1890, p. 32, pl. 3, figs. 32, 36; pl. 4, figs 5, 6, 18.—Fornasini, For. Plioc. Pont. Savena, pl. 2, fig. 5.—Chapman Journ. Roy. Micr. Soc., 1892, p. 324, pl. 5, fig. 14.—Egger, Abh. Bay Akad. Wiss. München, vol. 18, 1893, p. 260, pl. 4, figs. 16, 36.—Goës, Köngl Svensk. Vet. Akad. Handl., vol. 25, No. 9, 1894, p. 23, pl. 5, figs. 140, 141.—Chapman, Ann. Mag. Nat. Hist., vol. 16, 1895, p. 313, pl. 11, fig. 2 (?); Proc Zool. Soc. London, 1895, p. 16.—Goës, Bull. Mus. Comp. Zoöl., vol. 29, 1896, p. 32.—Millett, Journ. Roy. Micr. Soc., 1899, p. 357, pl. 5, fig. 1.—Bagg, Proc. U. S. Nat. Mus., vol. 34, 1908, p. 126.—Heron-Allen and Earland Journ. Roy. Micr. Soc., 1909, p. 322; Trans. Zool. Soc. London, vol. 20, 1915, p. 612.

Ammobaculites agglutinans Cushman, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p 115, fig. 176.—Pearcey, Trans. Roy. Soc. Edinburgh, vol. 49, 1914, p 1010.—Cushman, Proc. U. S. Nat. Mus., vol. 56, 1919, p. 600.

Haplophragmium calcareum Flint, Rep. U. S. Nat. Mus., 1897 (1899), p. 275 pl. 19, fig. 1 (not *H. calcareum* d'Orbigny).

Description.—Test elongate, early portion closely coiled, planospiral, of one or usually more coils, each with five to seven chambers, later portion uncoiled, subcylindrical, made up of a linear series of chambers, in adult specimens making up the larger portion of the test; wall rather coarsely arenaceous, somewhat variable in its surface, usually roughened, but occasionally fairly smooth; aperture in the early uncoiled portion slit-like, at the base of the apertural face, in the uncoiled portion the aperture is in the middle of the terminal face and is rounded; color variable, usually gray.

Diameter of coiled portion about 1 mm.; total length up to 3 mm.

Distribution.—This is a very widely distributed species, but has been used to include more than one species. Some of these are noted here, but older records as a rule need checking from the original specimens. In the *Albatross* material it is very common at numerous stations, in general between latitudes 37° and 40° N., and longitudes 66° and 74° W. Specimens were also obtained in the Gulf of Mexico which are referred to this species, but they are not as typical as a rule. It is best developed in fairly deep, cold water.

In the rougher specimens the sutures dividing the chambers are difficult to distinguish, but are more clearly shown in the smoother forms. As the amount of cement is not dominant, the color largely depends upon the material of which the test is composed.

Ammobaculites agglutinans—*material examined.*

Cat. No.	Coll. of	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°*F.*		
10490	U.S.N.M.	6	D2003...	37 16 30 N.; 74 20 36 W..	641	....	....	Few.
10491	U.S.N.M.	2	D2018...	37 12 22 N.; 74 20 04 W..	788	39	bu. m.......	Rare.
10492	U.S.N.M.	9	D2035...	39 26 16 N.; 70 02 37 W..	1,362	....	glob. oz.....	Common.
10493	U.S.N.M.	7	D2036...	38 52 0 N.; 69 24 40 W..	1,735	38	glob. oz.....	Common.
10494	U.S.N.M.	7	D2037...	38 53 00 N.; 69 23 30 W..	1,731	38	glob. oz.....	Common.
10495	U.S.N.M.	10+	D2038...	38 30 30 N.; 69 08 25 W..	2,033	....	glob. oz.....	Common.
10496	U.S.N.M.	10+	D2039...	38 19 26 N.; 68 20 20 W..	2,369	....	glob. oz....	Common.
10497	U.S.N.M.	10+	D2041...	39 22 50 N.; 68 25 00 W..	1,608	38	glob. oz.....	Common.
10498	U.S.N.M.	10+	D20 2...	39 33 00 N.; 68 26 45 W..	1,555	38.5	glob. oz.....	Common.
10499	U.S.N.M.	1	D2043...	39 49 00 N.; 68 28 30 W..	1,467	38.5	glob. oz.....	Few.
10500	U.S.N.M.	9	D2097...	37 56 20 N.; 70 57 30 W..	1,917	....	glob. oz.....	Common.
10501	U.S.N.M.	2	D2160...	23 10 31 N.; 82 20 37 W..	167	....	co.............	Rare.
10502	U.S.N.M.	6	D2202...	39 38 00 N.; 71 39 45 W..	515	39.1	gn. m........	Few.
10503	U.S.N.M.	3	D2204...	39 30 30 N.; 71 44 30 W..	728	39.1	br. m........	Few.
10504	U.S.N.M	9	D2221...	39 05 30 N.; 70 44 30 W..	1,525	36.9	gy. oz........	Frequent.
10505	U.S.N.M.	8	D2222...	39 03 15 N.; 70 50 45 W..	1,537	36.9	gy. oz........	Frequent.
10506	U.S.N.M.	2	D2226...	37 00 00 N.; 71 54 00 W..	2,015	36.8	glob. oz.....	Few.
10507	U.S.N.M.	4	D2212...	39 54 45 N.; 69 29 45 W..	250	41.6	gn. m. s.....	Few.
10508	U.S.N.M.	4	D2372...	29 15 30 N.; 85 29 30 W..	27	....	g............	Few.
10509	U.S.N.M.	1	D2377...	29 07 30 N.; 88 08 00 W..	210	67	gy. m........	Rare.
10510	U.S.N.M.	1	D2373...	28 43 00 N.; 87 14 30 W..	525	41.1	lt. gy. m....	Rare.
10511	U.S.N.M.	4	D2562...	39 15 30 N.; 71 25 00 W..	1,431	37.3	gy. oz........	Few.
10512	U.S.N.M.	8	D2568...	39 15 00 N.; 68 08 00 W..	1,781	36.9	gy. oz........	Common.
10513	U.S.N.M.	10+	D2570...	39 54 00 N.; 67 05 30 W..	1,813	36.8	glob. oz.....	Common.
10514	U.S.N.M.	1	D2572...	40 29 00 N.; 66 04 00 W..	1,769	37.8	gy. oz........	Few.
10515	U.S.N.M.	1	D2573...	40 34 18 N.; 66 09 00 W..	1,742	37.3	gy. m. s.....	Few.
10516	U.S.N.M.	4	D2581...	39 43 00 N.; 71 34 00 W..	394	....	gn. m......	Few.
10517	U.S.N.M.	1	D2584...	39 05 30 N.; 72 23 20 W..	541	39.5	gy. m.......	Rare.
10518	U.S.N.M.	1	D2677...	32 39 00 N.; 76 50 30 W..	478	39.3	gn. m........	Rare.
10519	U.S.N.M.	1	D2716...	38 29 30 N.; 70 57 00 W..	1,631	....	br. oz. for...	Rare.

AMMOBACULITES PSEUDOSPIRALE (Williamson).

Plate 12, fig. 4.

Proteonina pseudospiralis WILLIAMSON, Rec. Foram. Great Britain, 1858, p. 2, pl. 1, figs. 2, 3.

Lituola nautiloidea, "feeble form," PARKER and JONES, Introd. Foram., 1862, Appendix, p. 309.

Haplophragmium pseudospirale SIDDALL, Cat. British Recent Foram., 1879, p. 4.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 302, pl. 33, figs. 1-4.—WRIGHT, Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 467.—EGGER, Abh. bay. Akad. Wiss. München, vol. 18, 1893, p. 260, pl. 5, figs. 41, 42.—GOËS, Köngl. Svensk. Vet. Akad. Handl., vol. 25, No. 9, 1894, p. 23, pl. 5, figs. 146, 147 (not 142-144, 148-151).—MILLETT, Journ. Roy. Micr. Soc., 1899, p. 358.—SIDEBOTTOM. Proc. Manchester Lit. and Philos. Soc., vol. 49, pt. 2, No. 5, 1905, p. 3.—RHUMBLER, Foram. Plankton Exped., teil 1, 1911, pl. 2, fig. 15; teil 2, 1913, p. 379.—HERON-ALLEN and EARLAND, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 45; Trans. Linn. Soc. London, vol. 11, pt. 13, 1916, p. 223, pl. 40, fig. 14.

Description.—Test elongate, compressed, early portion spirally coiled, later portion uncoiled and straight but compressed throughout, chambers poorly marked, sutures indistinct; wall coarsely arenaceous with much cement, aperture irregular, usually a small opening at the end of the chamber.

Length, up to 1.5 mm.

Distribution.—Williamson's type specimens were from Skye. Brady gives the following localities "not uncommon amongst the islands on the west coast of Scotland at depths of 30-60 fathoms" (55-110 meters), two *Porcupine* dredgings from the coast of Ireland in 90 and 370 fathoms (165 and 677 meters) and from off Valentia, Ireland. Wright's specimens were from the southwest of Ireland 7-53 fathoms (13-97 meters) with a single very small specimen at 345 fathoms (631 meters). Heron-Allen and Earland record it as common in the Clare Island region off Ireland and off western Scotland.

It has not occurred in the *Albatross* material from the western Atlantic as far as I have seen and it is recorded neither by Goës nor by Flint from the same material.

In my own collection I have material from the second cruise of the S. S. *Protector* in 100 fathoms (183 meters), northwest of Belfast between Belfast and Port Patrick and from the *Lord Bandon* off S. W. Ireland in 38-44 fathoms (69-80 meters). The figures given by Goës and here referred to are very typical but as Goës included *A. foliaceum* also, the records are obscure.

The species is evidently common in comparatively shallow water off the coast of northern Europe but not from the western Atlantic as far as the material examined shows.

chambers, in adult specimens making up the larger portion of the test; wall rather coarsely arenaceous, somewhat variable in its surface, usually roughened, but occasionally fairly smooth; aperture in the early uncoiled portion slit-like, at the base of the apertural face, in the uncoiled portion the aperture is in the middle of the terminal face and is rounded; color variable, usually gray.

Diameter of coiled portion about 1 mm.; total length up to 3 mm.

Distribution.—This is a very widely distributed species, but has been used to include more than one species. Some of these are noted here, but older records as a rule need checking from the original specimens. In the *Albatross* material it is very common at numerous stations, in general between latitudes 37° and 40° N., and longitudes 66° and 74° W. Specimens were also obtained in the Gulf of Mexico which are referred to this species, but they are not as typical as a rule. It is best developed in fairly deep, cold water.

In the rougher specimens the sutures dividing the chambers are difficult to distinguish, but are more clearly shown in the smoother forms. As the amount of cement is not dominant, the color largely depends upon the material of which the test is composed.

Ammobaculites agglutinans—material examined.

Cat. No.	Coll. of —	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
10190	U.S.N.M.	6	D2003...	37 16 30 N.; 74 20 36 W..	641	....	....	Few.
10191	U.S.N.M.	2	D2018...	37 12 22 N.; 74 20 04 W..	788	39	bu. m.......	Rare.
10192	U.S.N.M.	9	D2035...	39 26 16 N.; 70 02 37 W..	1,362	....	glob. oz.....	Common.
10193	U.S.N.M.	7	D2036...	38 52 0 N.; 69 24 30 W..	1,735	38	glob. oz.....	Common.
10194	U.S.N.M.	7	D2037...	38 53 00 N.; 69 23 30 W..	1,731	38	glob. oz.....	Common.
10195	U.S.N.M.	10+	D2038...	38 30 30 N.; 69 08 25 W..	2,033	....	glob. oz.....	Common.
10196	U.S.N.M.	10+	D2039...	38 19 26 N.; 68 20 20 W..	2,369	....	glob. oz.....	Common.
10197	U.S.N.M.	10+	D2041...	39 22 50 N.; 68 25 00 W..	1,608	38	glob. oz.....	Common.
10198	U.S.N.M.	10+	D2042...	39 33 00 N.; 68 26 45 W..	1,555	38.5	glob. oz.....	Common.
10199	U.S.N.M.	1	D2043...	39 49 00 N.; 68 28 30 W..	1,467	38.5	glob. oz.....	Few.
10500	U.S.N.M.	9	D2097...	37 56 20 N.; 70 57 30 W..	1,917	....	glob. oz.....	Common.
10501	U.S.N.M.	2	D2160...	23 10 31 N.; 82 20 37 W..	167	....	co...........	Rare.
10502	U.S.N.M.	6	D2202...	39 38 00 N.; 71 39 45 W..	515	39.1	gn. m.......	Few.
10503	U.S.N.M.	3	D2204...	39 30 30 N.; 71 44 30 W..	728	39.1	br. m.......	Few.
10504	U.S.N.M.	9	D2221...	39 05 30 N.; 70 44 30 W..	1,525	36.9	gy. oz.......	Frequent.
10505	U.S.N.M.	8	D2222...	39 03 15 N.; 70 50 45 W..	1,537	36.9	gy. oz.......	Frequent.
10506	U.S.N.M.	2	D2226...	37 00 00 N.; 71 54 00 W..	2,015	36.8	glob. oz.....	Few.
10507	U.S.N.M.	4	D2262...	39 54 45 N.; 69 29 45 W..	250	41.6	gn. m. s.....	Few.
10508	U.S.N.M.	4	D2372...	29 15 30 N.; 85 29 30 W..	27	....	g............	Few.
10509	U.S.N.M.	1	D2377...	29 07 30 N.; 88 08 00 W..	210	67.	gy. m.......	Rare.
10510	U.S.N.M.	1	D2383...	28 43 00 N.; 87 14 30 W..	525	41.1	lt. gy. m....	Rare.
10511	U.S.N.M.	4	D2562...	39 15 30 N.; 71 25 00 W..	1,431	37.3	gy. oz.......	Few.
10512	U.S.N.M.	8	D2568...	39 15 00 N.; 68 08 00 W..	1,781	36.9	gy. oz.......	Common.
10513	U.S.N.M.	10+	D2570...	39 54 00 N.; 67 05 30 W..	1,813	36.8	glob. oz.....	Common.
10514	U.S.N.M.	1	D2572...	40 29 00 N.; 66 04 00 W..	1,769	37.8	gy. oz.......	Few.
10515	U.S.N.M.	1	D2573...	40 34 18 N.; 66 09 00 W..	1,742	37.3	gy. m. s.....	Few.
10516	U.S.N.M.	4	D2581...	39 43 00 N.; 71 34 00 W..	394	....	gn. m.......	Few.
10517	U.S.N.M.	1	D2584...	39 05 30 N.; 72 23 20 W..	541	39.5	gy. m.......	Rare.
10518	U.S.N.M.	1	D2677...	32 39 00 N.; 76 50 30 W..	478	39.3	gn. m.......	Rare.
10519	U.S.N.M.	1	D2716...	38 29 30 N.; 70 57 00 W..	1,631	....	br. oz. for...	Rare.

AMMOBACULITES AMERICANUS Cushman.

Plate 12, figs. 6 and 7.

Haplophragmium fontinense H. B. BRADY (not *H. fontinense* Terquem), Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 305, pl. 34, figs. 1–4.—EGGER, Abh. Bay. Akad. Wiss. München, vol. 18, 1893, p. 261, pl. 5, fig. 47.—GOËS, Bull. Mus. Comp. Zoöl., vol. 29, 1896, p. 31.—CHAPMAN, Journ. Linn. Soc. Zoology, vol 30, 1910, p. 401.

Ammobaculites americanus CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 117, figs. 184, 185.—PEARCEY, Trans. Roy. Soc. Edinburgh, vol. 49, 1914, p. 1019

Description.—Test planospiral in the early portion, compressed, only partially involute, composed of three or four coils with about nine chambers in the outer coil, the last-formed chambers in adult specimens tending to form uncoiled straight growth; chambers distinct, sutures slightly depressed; wall of fairly coarse sand grains firmly cemented; aperture elongate, oval, or forming a long slit across the apertural face of the chamber; color gray.

Length up to 2.5 mm.

Distribution.—As *H. fontinense* this species is recorded by Brady from the South Atlantic, *Challenger* station 323 east of Buenos Aires in 1,900 fathoms (3,475 meters).

It is also known from the west coast of South America (Brady), from the west coast of Mexico (Goës, Cushman), from deep water off Funafuti, (Chapman), and from the Antarctic (Pearcey). Egger records the species from off Mauritius, but his figure would not warrant one in putting it in this species without examining the original material. It is evidently a species of the South Atlantic and Pacific.

AMMOBACULITES FOLIACEUS (H. B. Brady).

Plate 13, figs. 1 and 2.

Haplophragmium foliaceum H. B. BRADY, Quart. Journ. Micr. Sci., vol. 21, 1881, p. 50; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 304, pl. 33, figs. 20–25.—FLINT, Rep. U. S. Nat. Mus., 1897 (1899), p. 276, pl. 19, fig. 6.

Ammobaculites foliaceus CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 116, figs. 177–179.

Description.—Test much compressed, elongate, early portion close coiled, planospiral, consisting of two or three coils; later portion uncoiled, straight, uniserial; chambers distinct, sutures usually well marked, but not depressed; wall coarsely arenaceous but with a smooth surface; aperture in the uncoiled portion of the adult simple, terminal, elongate; color reddish or yellowish brown.

Length up to 1.25 mm.

Distribution.—The distribution of this species from the available records includes a wide area. The best *Challenger* material according to Brady was from station 323 in the South Atlantic east of Buenos Aires in 1,900 fathoms (3,475 meters), where it was "tolerably abundant." The other records are south of Australia, 2,600 fathoms (4,755 meters); north of New Guinea, 1,070 fathoms (3,109 meters), and south of Japan, 345 fathoms (631 meters); "but the specimens from these [last three] localities are of poor dimensions and few in number." Flint records it from two *Albatross* stations D2377 in the Gulf of Mexico in 210 fathoms (384 meters) [?] and D2568 off Marthas Vineyard in 1,781 fathoms (3,257 meters). I have had the species from nine *Albatross* stations all but one of them south and west of the Georges Banks at depths ranging from 1,362 to 2,369 fathoms (2,491 to 3,332 meters). There is a later *Challenger* record from this same region, station 44 in 1,700 fathoms (3,109 meters). The other station is from the Gulf of Mexico in 27 fathoms. In examining the material in Dr. Flint's collection I find a slide with specimens from D2377 and D2568, the whole marked *Haplophragmium foliaceum.* There are numerous specimens of both *Ammobaculites foliaceus* and *A. tenuimargo* and as I have found *A. tenuimargo* at this station and not *A. foliaceus* I am inclined to think that Doctor Flint's record for *A. foliaceus* from D2377 should be changed to *A. tenuimargo.* Both species are however found in the Gulf of Mexico.

A. foliaceus is a very well defined species easily distinguished and it seems odd that it is not more often recorded if it has the wide distribution that Brady's other records seem to indicate. An examination of the original *Challenger* material should show whether these other records are this species or whether this is really an Atlantic species. It should be noted, however, that numerous species which have their origin in the Indo-Pacific are found along the western side of the Atlantic but not on the eastern side.

Ammobaculites foliaceus—material examined.

Cat. No.	Coll. of –	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
10481	U.S.N.M.	2	D2035...	39 26 16 N.; 70 02 37 W..	1,362	....	glob. oz.....	Rare.
10482	U.S.N.M.	3	D2036...	38 52 40 N.; 69 24 40 W..	1,735	38	glob. oz.....	Rare.
10483	U.S.N.M.	1	D2037...	38 53 00 N.; 69 23 30 W..	1,731	38	glob. oz.....	Rare.
10484	U.S.N.M.	3	D2038...	38 30 30 N.; 69 08 25 W..	2,033	....	glob. oz.....	Few.
10485	U.S.N.M.	7	D2039...	38 19 26 N.; 68 20 20 W..	2,369	....	glob. oz.....	Few.
10486	U.S.N.M.	5	D2097...	37 56 20 N.; 70 57 30 W..	1,917	....	glob. oz.....	Few.
10487	U.S.N.M.	2	D2226...	37 00 00 N.; 71 54 00 W..	2,045	36.8	glob. oz.....	Few.
10488	U.S.N.M.	6	D2372...	29 15 30 N.; 85 29 30 W..	27	....	g............	Few.
10489	U.S.N.M.	2	D2570...	39 54 00 N.; 67 05 30 W..	1,813	36.8	glob. oz.....	Few.

AMMOBACULITES TENUIMARGO (H. B. Brady).

Plate 13, figs. 3–5.

Haplophragmium tenuimargo H. B. Brady, Proc. Roy. Soc. Edinburgh, vol. 11, 1882, p. 715; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 303, pl. 33, figs. 13-16.—Flint, Rep. U. S. Nat. Mus., 1897 (1899), p. 275, pl. 19, fig. 3.

Ammobaculites tenuimargo CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 117, figs. 180–183.—PEARCEY, Trans. Roy. Soc. Edinburgh, vol. 49, 1914, p. 1010.

Description.—Test elongate, compressed, early portion close coiled, consisting of one to one and a half coils, later portion uncoiled, consisting in fully developed specimens of 11 to 13 chambers increasing gradually in size toward the apertural end, edges jagged, of coarse sand grains; chambers irregular in size and shape, made of a chitinous lining, to the outside of which are attached sand grains; wall thin on the inside, of chitin (?) and the exterior of angular quartz grains; aperture a small, rounded, simple opening at the end of the last-formed chamber; color white or gray.

Length, up to 2.5 mm.

Distribution.—This is a widely distributed species, the Atlantic *Challenger* records being Faroe Channel, 530 fathoms (969 meters); station 5, southwest of the Canaries, in 2,740 fathoms (5,011 meters); 323, east of Buenos Aires; 24, off Culebra Island, in 390 fathoms (713 meters), and 78, off western Africa, in 1,000 fathoms (1,829 meters).

Flint records the species from two *Albatross* stations, D2115, in 843 fathoms (1,542 meters), and D2584, in 541 fathoms (989 meters), off the northeastern coast of the United States. Pearcey records it from two *Scotia* stations in the South Atlantic or Antarctic in 1,775 and 2,620 fathoms (3,246 and 4,791 meters).

I have had specimens from eight *Albatross* stations, one in the Gulf of Mexico, the others off the eastern and northeastern coast of the United States. Depths range from 88 to 786 fathoms (161 to 1,437 meters), which is a much shallower range than for *A. foliaceus* from the same general region.

Outside the Atlantic the only records seem to be those of the *Challenger* report, stations 218, north of New Guinea, 1,070 fathoms; (3,109 meters); 168, east of New Zealand, 1,100 fathoms (2,012 meters), and 238, in the North Pacific, in 3,950 fathoms (7,224 meters).

An examination of specimens mounted in Canada balsam shows that there is a thin, brownish wall about each chamber and that they are very irregular, especially in the uncoiled part, the sand grains, most of which are of clear quartz, being simply incrusting instead of forming a constituent part of the wall, as in most other species. There is some indication that there are both microspheric and megalospheric forms in the material, the former with a coiled portion with small proloculum, while the other has a larger first chamber and the coil not so well developed.

Ammobaculites tenuimargo—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
10473	U.S.N.M.	6	D2018...	37 12 22 N.; 74 20 04 W..	788	39	bu. m.......	Few.
10474	U.S.N.M.	2	D2189...	39 49 30 N.; 70 26 00 W..	600	39.7	gn. m. s.....	Few.
10475	U.S.N.M.	2	D2202...	39 38 00 N.; 71 39 45 W..	515	39.1	gn. m.......	Few.
10476	U.S.N.M.	1	D2203...	39 34 15 N.; 71 41 15 W..	705	38.9	gn. m. s.....	Rare.
10477	U.S.N.M.	3	D2204...	39 30 30 N.; 71 44 30 W..	728	39.1	br. m.......	Rare.
10480	U.S.N.M.	1	D2312...	32 54 00 N.; 77 53 30 W..	88	57.8	crs. s. bk. sp.	Rare.
10478	U.S.N.M.	5	D2377...	29 07 30 N.; 88 08 00 W..	210	67	gy. m.......	Few.
10479	U.S.N.M.	3	D2581...	39 43 00 N.; 71 34 00 W..	394	....	gn. m.......	Few.

AMMOBACULITES REOPHACIFORMIS Cushman.

Plate 13, fig. 6.

Haplophragmium agglutinans H. B. Brady (part, not d'Orbigny), Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, pl. 32, fig. 22 (not 19–21, 23–26).

Ammobaculites reophaciformis Cushman, Proc. U. S. Nat. Mus., vol. 38, 1910, p. 440.

Description.—Test elongate, tapering, early portion consisting of a few chambers planospirally coiled and much compressed, making up but a small portion of the test, later and by far the larger part uncoiled, forming a straight linear series, circular in transverse section, and progressively increasing in size, the last-formed one being the largest, chambers fairly distinct, sutures slightly depressed; wall composed of angular fragments, smoothly finished; aperture circular, terminal, simple, occasionally with a slight neck; color usually white or gray.

Length, up to 3.5 mm.

Distribution.—Originally described from the Philippine region in depths of from 16–78 fathoms (29–143 meters) in coral-reef regions, this species is now known to be widely distributed. The lack of fine coral-reef material from the West Indies is the only reason for its not being more widely recorded here. I have it from one *Albatross* station, D2641, in 60 fathoms (110 meters), bottom temperature 69.2° F., (20.6° C.), off the coast of Florida. There is material also from the Tortugas in the Gulf of Mexico, and I have found it to be common in my own dredgings in 6–10 fathoms (11–18 meters) among the coral reefs at Montego Bay, Jamaica. It is undoubtedly widespread in the Bahamas, West Indies, and Florida among coral-reef conditions.

I have had material also from the coral reefs of the Hawaiian Islands.

Genus HAPLOPHRAGMIUM Reuss, 1860.

Spirolina Roemer (not Lamarck), Verst. norddeutsch. Kreide, 1840–41, p. 98.

Haplophragmium Reuss, Sitz. Akad. Wiss. Wien, vol. 40, 1860, p. 218. (Type, *Spirolina aequalis* Roemer.)

Description.—Test in the early portion close coiled, planospiral, later becoming uncoiled and straight; chambers distinct, not labyrinthic; wall arenaceous; aperture in the adult consisting of a number of pores, the apertural face often becoming sievelike.

This genus may be distinguished from *Ammobaculites* mainly in the characteristic aperture, which in its highest development becomes sievelike, with numerous pores, while that of *Ammobaculites* is simple. The tendency also in elongate specimens is for an increase in the size of the chambers as added, while in *Ammobaculites* the size is usually fairly constant when once attained, except in *A. reophaciformis.*

The genus as used by Reuss has been variously applied until at one time used for all the coiled, trochoid, or irregularly coiled tests with coarse, arenaceous walls. It is here used in its original sense as nearly as can be determined.

HAPLOPHRAGMIUM LITUOLINOIDEUM Goës.

Plate 13, fig. 7.

Haplophragmium lituolinoideum Goës, Bull. Mus. Comp. Zoöl., vol. 29, 1896, p. 32, pl. 3, figs. 17-20.

Description.—Test elongate, subcylindrical or conical, the early portion coiled, later portion uncoiled, uniserial, circular in transverse section; chambers distinct, those of the uncoiled portion gradually increasing in diameter, sutures distinct, slightly depressed; wall coarsely arenaceous; aperture in the early portion single, in the later portion becoming multiple and in large specimens composed of a considerable number of pores making a sievelike plate of the apertural face of the chamber; color gray or brown.

Length up to 3 mm.

Distribution.—Goës described this species from *Albatross* stations in the Gulf of Mexico at depths of 347-727 fathoms (635-1,330 meters). There is one lot of mounted material in the Goës collection and with that as a guide with the slightly conventionalized figure it is possible to make out the species clearly. In the examination of the *Albatross* Atlantic dredgings it has been found to be well distributed along the Atlantic coast of the United States and in the northern part of the Gulf of Mexico. Twenty stations are here given ranging in depth from 390 to 1,735 fathoms (713 to 3,173 meters).

It is evidently a *Haplophragmium* with its sievelike aperture and undivided chambers and can easily be distinguished from *Ammobaculites agglutinans* by the shape of the uncoiled portion which in *A. agglutinans* is cylindrical while that of *H. lituolinoideum* is decidedly conical. The aperture will of course at once prove the distinguishing character.

Haplophragmium lituolinoideum—*material examined.*

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
10678	U.S.N.M.	2	D2036...	38 52 40 N.; 69 24 40 W..	1,735	38	glob. oz.....	Few.
10679	U.S.N.M.	1	D2072...	41 53 00 N.; 65 35 00 W..	858	39	gy. m........	Rare.
10680	U.S.N.M.	2	D2110...	35 12 10 N.; 74 57 15 W..	516	40	bu. m.......	Rare.
10681	U.S.N.M.	3	D2111...	35 09 50 N.; 74 57 40 W..	938	....	gn. m.......	Rare.
10682	U.S.N.M.	6	D2115...	35 49 30 N.; 74 34 45 W..	843	39	m., fne. s....	Few.
10683	U.S.N.M.	1	D2171...	37 59 30 N.; 73 48 40 W..	444	39.5	gn. m.......	Rare.
10684	U.S.N.M.	3	D2203...	39 34 15 N.; 71 41 15 W..	705	38.9	gn. m. s.....	Rare.
10685	U.S.N.M.	1	D2204...	39 30 30 N.; 71 44 30 W..	728	39.1	br. m.......	Rare.
10686	U.S.N.M.	2	D2219...	39 46 22 N.; 69 29 00 W..	948	38.8	gy. m.......	Rare.
10687	U.S.N.M.	3	D2234...	39 09 00 N.; 72 03 15 W..	810	38.6	gn. m.......	Rare.
10688	U.S.N.M.	2	D2383...	28 32 00 N.; 88 06 00 W..	1,181	39.8	br. gn. m....	Rare.
10689	U.S.N.M.	4	D2385...	28 51 00 N.; 88 18 00 W..	730	40.1	gy. m.......	Few.
10690	U.S.N.M.	1	D2392...	28 47 30 N.; 87 27 00 W..	724	40.7	br. gy. m....	Rare.
10691	U.S.N.M.	1	D2394...	28 38 30 N.; 87 02 00 W..	420	41.8	gn. m.......	Rare.
3098	U.S.N.M.	1	D2530...	40 53 30 N.; 66 26 30 W..	956	38.4	gy. oz.......	Rare.
10692	U.S.N.M.	1	D2531...	40 42 00 N.; 66 33 00 W..	852	38.4	gy. m.......	Rare.
10693	U.S.N.M.	2	D2547...	39 54 30 N.; 70 20 00 W..	390	39.6	gn. m.......	Rare.
10694	U.S.N.M.	1	D2562...	39 15 30 N.; 71 25 00 W..	1,434	37.3	gy. oz.......	Rare.
10695	U.S.N.M.	4	D2581...	39 43 00 N.; 71 34 00 W..	394	....	gn. m.......	Few.
10696	U.S.N.M.	2	D2706...	41 28 30 N.; 65 35 30 W..	1,188	....	gy. oz. for....	Rare.
10697	U.S.N.M.	2	D2710...	40 06 00 N.; 68 01 30 W..	984	....	gn. m.......	Rare.

Genus LITUOLA Lamarck, 1804.

Lituola Lamarck, Ann. Mus., vol. 5, 1804, p. 243 (Type, *L. nautiloidea* Lamarck).

Description.—Test crozier-shaped, the early portion planospiral, the later portion uncoiled and straight, test arenaceous, the chambers labyrinthic with radial vertical partitions and secondary septae; aperture typically of several pores.

The original material was Cretaceous but the following species seems to belong here unless an examination of the type species of the genus may show other characters.

It has the uncoiled test with the typical labyrinthic divisions, thus meeting the requirement of the characters of the genus.

LITUOLA MEXICANA, new species.

Plate 14, figs. 1–4.

Description.—Test of medium size, conical, the early portion close coiled, planospiral, consisting of one or more coils and making up a very small part of the entire test; remainder of the test uncoiled, straight, linear, the chambers gradually increasing in size, the last-formed one being the largest; chambers numerous, inflated, sutures distinctly depressed, interior labyrinthic, with radial partitions dividing the chamber and in addition various irregular secondary partitions; wall finely arenaceous with much cement; aperture uncertain, with a deep reëntrant circular mouth; color yellowish brown.

Length, 3.5 mm.

Distribution.—Type specimen (U.S.N.M. No. 10698) from *Albatross* station D2399 in the Gulf of Mexico in 196 fathoms (358 meters), bottom temperature 51.6° F. (10.9° C.) and not found elsewhere in the material examined.

This is a large and conspicuous species, at first sight like *Ammobaculites* but with very beautiful labyrinthic chambers and the aperture so far as may be seen in the specimens not multiple but a large circular opening deeply depressed at the sides.

Genus PLACOPSILINA d'Orbigny, 1850.

Placopsilina D'ORBIGNY, Prodr. Pal., vol. 2, 1850, p. 96. (Type, *Placopsilina cenomana* d'Orbigny).—H. B. BRADY (part), Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 315.—CHAPMAN, The Foraminifera, 1902, p. 139.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 118.

Description.—Test attached, composed of numerous chambers, the early portion close-coiled, later portions uncoiling and spreading out in an irregular but in general a linear series of chambers, building no floor; last portion of the test may be entirely free, made up of an irregular series of chambers; wall coarsely arenaceous, aperture rounded, at the end of the last-formed chamber.

The genus is characteristic of shallow waters of tropical or subtropical regions.

PLACOPSILINA CENOMANA d'Orbigny.

Plate 14, fig. 5.

Placopsilina cenomana d'ORBIGNY, Prodr. Pal., vol. 2, 1850, p. 185, No. 758.—REUSS, Denkschr. Akad. Wiss. Wien, vol. 7, 1854, p. 71, pl. 28, figs. 4, 5.—BÜTSCHLI, in Bronn, Klassen und Ordnungen des Thierreichs, vol. 1, 1880, p. 191, pl. 5, fig. 19.—HAEUSLER, Quart. Journ. Geol. Soc., vol. 39, 1883, p. 27, pl. 3, fig. 1; Neues Jahrb., vol. 1, 1883, p. 59, pl. 3, figs. 12–14.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 315, pl. 36, fig. 1.—WRIGHT, Proc. Belfast Nat. Field Club, 1884–85, App. 9, 1886, p. 320, pl. 26, figs. 3*a*, *b*.—HAEUSLER, Neues Jahrb., Beil., vol. 4, 1885, p. 8, pl. 1, figs. 24–25.—HOWCHIN, Journ. Roy. Micr. Soc., 1888, p. 536, pl. 8, fig. 4.—H. B. BRADY, PARKER, and JONES, Trans. Zool. Soc., vol. 12, 1888, p. 218, pl. 42, fig. 13.—J. WRIGHT, Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 468.—CHAPMAN, Journ. Roy. Micr. Soc., 1892, p. 324, pl. 6, fig. *A*; Proc. Zool. Soc. London, 1895, p. 17; The Foraminifera, 1902, p. 139, pl. 7, fig. *E*.—SIDEBOTTOM, Mem. and Proc. Manchester Lit. and Philos. Soc., vol. 49, No. 5, 1905, p. 4, pl. 1, fig. 7.—EARLAND, Journ. Quekett Micr. Club, ser. 2, vol. 9, 1905, p. 200.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 119, fig. 186.—HERON-ALLEN and EARLAND, Trans. Zool. Soc. London, vol. 20, 1915, p. 615.

Lituola cenomana JONES and PARKER, Quart. Journ. Geol. Soc., vol. 16, 1860, p. 302.—H. B. BRADY, Proc. Somerset Arch. and Nat. Hist. Soc., vol. 13, 1867, p. 105, pl. 1, fig. 1.

Lituola (*Placopsilina*) *cenomana* W. B. CARPENTER, PARKER, and JONES, Intr. Foram., 1862, p. 143, pl. 11, figs. 11–14.

Description.—Test attached, early portion close coiled, of one or more whorls, later portion uncoiled, straight or irregular, of nearly uniform diameter, chambers of about the same length; chambers distinct, sutures distinct and slightly depressed; wall coarsely arenaceous; aperture simple, terminal; color gray.

Length, up to 5 mm.

Distribution.—This species seems to be fairly common in comparatively shallow water of tropical and subtropical seas but is known as far north as the British Isles. It has not been met with in the *Albatross* material except once, probably partly because the material is not favorable for attached forms. It occurred at D2371 in the Gulf of Mexico in 26 fathoms (48 meters).

Placopsilina cenomana—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		° F.		
10551	U.S.N.M.	1	D2371...	29 17 00 N.; 85 30 45 W..	26	....	gy. s. brk. sh.	Rare.

PLACOPSILINA CONFUSA, new species.

Plate 14, fig. 6.

Placopsilina cenomana H. B. BRADY (part, not *P. cenomana* d' Orbigny), Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, pl. 36, fig. 3.

Description.—Test small, early portion close coiled, later portion formed of a considerable number of irregularly hemispherical chambers in a more or less confused mass or in an irregularly winding series, chambers distinct, wall arenaceous with much yellowish or reddish brown cement; aperture small, at the end of the chamber; color yellowish or reddish brown.

Length, up to 0.60 mm.

Distribution.—Type specimens (U.S.N.M. No. 10549) from *Albatross* station D2115 in 843 fathoms (1,542 meters) east of Cape Hatteras. Other specimens occurred at stations in the same general region.

The species is attached to *Rhabdammina* and other arenaceous species and is therefore easily overlooked being small and of the same color as the material to which it is attached. The small size and peculiar arrangement of the chambers also make it inconspicuous. It is not unlike Brady's figure 3 of plate 36 of the *Challenger* Report in its more regular form. The measurement of those specimens is about 0.40–0.60 mm. while the typical *P. cenomana* of figure 1 is nearly ten times this size and lacks the color of *P. confusa*.

Placopsilina confusa—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		° F.		
10548	U.S.N.M.	1	D2111...	35 09 50 N.; 74 57 40 W..	938	....	gn. m.......	Few.
10549	U.S.N.M.	1	D2115...	35 49 30 N.; 74 34 45 W..	843	39	m., fne. s....	Few.
10550	U.S.N.M.	1	D2171...	37 59 30 N.; 73 48 40 W..	444	39.5	gn. m.......	Few.

Genus TROCHAMMINA Parker and Jones, 1860.

Nautilus (part) Montagu, Test. Brit., Suppl., 1808, p. 81.

Rotalina (part) Williamson, Rec. Foram. Great Britain, 1858, p. 50.

Globigerina (part) Williamson, Rec. Foram. Great Britain, 1858, p. 56.

Trochammina (part) Parker and Jones, Quart. Journ. Geol. Soc., vol. 16, 1860, p. 304.—W. B. Carpenter, Parker, and Jones, Intr. Foram., 1862, p. 141.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 337.—Eimer and Fickert, Zeitschr. Wiss. Zool., vol. 65, 1899, p. 695.—Chapman, The Foraminifera, 1902, p. 151.—Cushman, Bull. 71, U. S. Nat. Mus., pt., 1910, p. 120.—(Type, *T. inflata* (Montagu).=*Nautilus inflatus* Montagu.)

Lituola (part) Parker and Jones, Philos. Trans., vol. 155, 1865, p. 407.

Haplophragmium (part) Siddall, Cat. British Rec. Foram., 1879, p. 4.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 312.—Chapman, The Foraminifera, 1902, p. 138.

Ammoglobigerina Eimer and Fickert, Zeitschr. Wiss. Zool., vol. 65, 1899, p. 704.

Description.—Test free or sometimes adherent, spiral, trochoid, chambered; all chambers visible when viewed from above, only the chambers of the last-formed volution visible from below; wall arenaceous usually with considerable cement; aperture an arched slit on the ventral side of the chamber at its contact with the preceding volution.

As here considered, *Trochammina* is restricted to those species like *T. inflata* or *T. squamata*, which have a true spiral, trochoid test with all the chambers visible only from above.

TROCHAMMINA SQUAMATA Jones and Parker.

Trochammina squamata Jones and Parker, Quart. Journ. Geol. Soc., vol. 16, 1860, p. 304.—W. B. Carpenter, Parker, and Jones, Intr. Foram., 1862, p. 141, pl. 11, fig. 1.—Parker and Jones, Philos. Trans., 1865, p. 407, pl. 15, figs. 30, 31*a–c*.—H. B. Brady, Ann. Mag, Nat. Hist., ser. 4, vol. 6, 1870, p. 288, pl. 11, fig. 4; Quart. Journ. Micr. Soc., vol. 19, 1879, p. 56.—Haeusler, Neues Jahrb., 1883, pt. 1, p. 60, pl. 4, fig. 8.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 337, pl. 41, figs. 3*a–c*.—Haeusler, [?] Neues Jahrb., Beil., vol. 4, 1885, p. 29, pl. 3, fig. 30.—Balkwill and Wright, Trans. Roy. Irish Acad., p. 65, pl. 10, figs. 27-29, 40.—Haeusler, Abh. Schweiz. Pal. Ges., vol. 17, 1890, vol. 28, 1885, p. 331.—J. Wright, Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 469.—Egger, Abh. Bay. Akad. Wiss. München, vol. 18, 1893, p. 264, pl. 5, figs. 4–6.—Eimer and Fickert, Zeitschr. Wiss. Zool., vol. 65, 1899, p. 695, fig. 43 (in text).—Millett, Journ. Roy. Micr. Soc., 1899, p. 362.—Sidebottom, Mem. and Proc. Manchester Lit. and Philos. Soc., vol. 49, No. 5, 1905, p. 5.—Earland, Journ. Queckett Micr. Club, ser. 2, vol. 9, 1905, p. 202.—Heron-Allen and Earland, Journ. Roy. Micr. Soc., 1909, p. 325.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 120, fig. 187*a–b*.—Heron-Allen and Earland, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 50, pl. 3, figs. 7-10; Trans. Zool. Soc. London, vol. 20, 1915, p. 619; Trans. Linn. Soc. London, vol. 11, pt. 13, 1916, p. 228.—Cushman, Proc. U. S. Nat. Mus., vol. 56, 1919, p. 600 (?).

Trochammina proteus Karrer (part), Sitz. Akad. Wiss. Wien., vol. 52, 1865, p. 494, pl. 1, fig. 6 (not 1–5, 7, 8).

Description.—Test trochoid, low spired, composed of three or four volutions with five or more chambers in each whorl; chambers all visible from above, lunate, sutures oblique, from below generally triangular, sutures slightly curved, umbilicate; wall arenaceous, rather smoothly cemented; aperture elongate, slightly arched, at the base of the chamber; color yellowish brown.

Diameter up to 1.25 mm.

Distribution.—Most of the records indicate that this species is found most frequently in comparatively shallow water. The few *Albatross* records however are in comparatively deep water, but the specimens seem to belong to this species. The other records are well scattered, those from about the British Isles in shallow water. There seem to be no records from the South Atlantic.

Heron-Allen and Earland discuss this species in their Clare Island paper, noting that in the *Challenger* report Brady was not correct in his figures and that a later confusion has resulted.

Trochammina squamata—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
10702	U.S.N.M.	1	D2039...	38 19 26 N.; 68 20 20 W..	2,369	....	glob. oz.....	Rare.
10703	U.S.N.M.	1	D2222...	39 03 15 N.; 70 50 45 W..	1,537	36.9	gy. oz.......	Rare.
10704	U.S.N.M.	1	D2562...	39 15 30 N.; 71 25 00 W..	1,434	37.3	gy. oz.......	Rare.
10705	U.S.N.M.	1	D2677...	32 39 00 N.; 76 50 30 W..	478	39.3	gn. m.......	Rare.

TROCHAMMINA INFLATA (Montagu).

Nautilus inflatus MONTAGU, Test. Brit., Suppl., 1808, p. 81, pl. 18, fig. 3.

Rotalina inflata WILLIAMSON, Rec. Foram. Great Britain, 1858, p. 50, pl. 4, figs. 93, 94.—PARKER and JONES, Ann. Mag. Nat. Hist., ser. 3, vol. 4, 1859, p. 347, fig. F.—WILLIAMSON, Pop. Sci. Rev., vol. 4, 1865, p. 174, pl. 8, fig. 8.

Trochammina inflata W. B. CARPENTER, PARKER, and JONES, Int. Foram., 1862, p. 141, pl. 11, fig. 5.—H. B. BRADY, Nat. Hist. Trans. Northumberland and Durham, vol. 1, 1865, p. 95.—HAEUSLER, Ann. Mag. Nat. Hist., ser. 5, vol. 10, 1882, p. 351, pl. 15, figs. 5–7; Neues Jahrb., 1883, pl. 1, fig. 60; pl. 4, figs. 6, 7.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 338, pl. 41, figs. 4*a–c*.—HAEUSLER, Abh. Schweiz. Pal. Ges., vol. 17, 1890, p. 65, pl. 10, figs. 25, 26.—J. WRIGHT, Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 469.—WOODWARD and THOMAS, Geol. and Nat. Surv. Minnesota, vol. 3, 1893, p. 28, pl. D, fig. 31.—EGGER, Abh. Bay. Akad. Wiss. München, vol. 18, 1893, pl. 5, figs. 10–12, 16–18.—GOËS, Köngl. Svensk. Vet. Akad. Handl., vol. 25, No. 9, 1894, p. 29, pl. 6, figs. 222–224.—MILLETT, Journ. Roy. Micr. Soc., 1899, p. 364.—FORNASINI, Mem. Real. Accad. Sci. Ist. Bologna, vol. 8, 1900, p. 367, fig. 15.—SIDEBOTTOM, Mem. and Proc. Manchester Lit. and Philos. Soc., vol. 49, No. 5, 1905, p. 6, pl. 1, fig. 9.—EARLAND, Journ. Quekett Micr. Club, ser. 2, vol. 9, 1905, p. 203.—HERON-ALLEN and EARLAND, Journ. Roy. Micr. Soc., 1909, p. 324.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 121, fig. 188*a*, *b*.—HERON-ALLEN and EARLAND, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 52; Trans. Zool. Soc. London, vol. 20, 1915, p. 620; Trans. Linn. Soc. London, vol. 11, pt. 13, 1916, p. 227.

Description.—Test trochoid, low spired, composed of about three volutions, the last-formed one consisting of five or six chambers, umbilicate, all chambers visible from above, only those of the last-formed coil from below; chambers inflated, subglobose, sutures distinct and deep, nearly at right angles to the periphery; wall of fine sand with an excess of cement, smooth and dully shining; aperture small, a small arched slit where the chamber meets the previous volution on the ventral side and slightly in from the periphery, color clear yellowish brown, the spire often darker than the outer whorl.

Diameter up to 1 mm.

Distribution.—Nearly all the records for this species are in comparatively shallow water. Brady records it from one *Challenger* station off Buenos Aires in 1,900 fathoms (3,475 meters), also as occurring at intervals all about the British Isles, on the northeast shore of the Bay of Biscay and the coast of Spain. It is recorded about the British Isles by various writers, especially by Balkwill and Wright and by Heron-Allen and Earland. The only *Albatross* stations from which I have seen it are one each from the Gulf of Mexico and the eastern coast of the United States in comparatively deep water.

Much more typical material however occurs in shallow water or shore sands of southern New England. I have specimens from shore sands from the following: Coffins Beach, Annisquam; Revere Beach; Nahant Beach; and from the bathing beach at Buzzards Bay, all in Massachusetts. These are clear honey yellow for the most part with the center somewhat darker. It is probably common in shallow water all along our coast.

Trochammina inflata—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		° F.		
10700	U.S.N.M.	1	D2037...	38 53 00 N.; 69 23 30 W..	1,731	38	glob. oz......	Rare.
10701	U.S.N.M.	2	D2383...	28 32 00 N.; 88 06 00 W..	1,181	39.8	br. gn. m....	Rare.

TROCHAMMINA INFLATA (Montagu), var. MACRESCENS H. B. Brady.

Plate 15, fig. 1.

Trochammina inflata (Montagu), var. *macrescens* H. B. Brady, in G. S. Brady, Robertson, and H. B. Brady, Ann. Mag. Nat. Hist., ser. 4, vol. 6, 1870, p. 290, pl. 11, fig. 5.—H. B. Brady, Journ. Roy. Micr. Soc., 1887, p. 892.—Earland, Journ. Queckett Micr. Club, ser. 2, vol. 9, 1905, p. 203.—Heron-Allen and Earland, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 52; Trans. Linn. Soc. London, vol. 11, pt. 13, 1916, p. 227.

Variety differing from the typical in the more compressed form, and thinner test, probably as suggested by Heron-Allen and Earland a form due to low salinity of the water in which it lives.

Distribution.—Known from the region of the British Isles and not recorded elsewhere.

TROCHAMMINA NITIDA H. B. Brady.

Plate 15, fig. 2.

Trochammina nitida H. B. BRADY, Quart. Journ. Micr. Sci., vol. 21, 1881, p. 52; Denkschr. Akad. Wiss. Wien, vol. 43, 1881, p. 100; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 339, pl. 41, figs. 5, 6.—GOËS, Köngl. Svensk. Vet. Akad. Handl., vol. 25, No. 9, 1894, p. 30, pl. 6, figs. 225–230.—MILLETT, Journ. Roy. Micr. Soc., 1899, p. 363.—AWERINZEW, Mem. Acad. Imp. Sci. St. Petersbourg, ser. 8, vol. 29, No. 3, 1911, p. 21.—PEARCEY, Trans. Roy. Soc. Edinburgh, vol. 49, 1914, p. 1011.—HERON-ALLEN and EARLAND, Trans. Zool. Soc. London, vol. 20, 1915, p. 620; Trans. Linn. Soc. London, vol. 11, pt. 13, 1916, p. 228, pl. 40, figs. 19–21.

Description.—Test small, trochoid, depressed, composed of about three volutions, flattened above, convex below, somewhat umbilicate, periphery evenly rounded; chambers numerous, about nine in the last formed whorl, all visible from above only those of the last whorl from below, sutures straight or slightly curved, nearly at right angles to the periphery, slightly depressed; wall arenaceous, smoothly finished, aperture a curved slit near the base of the chamber; color gray brown, the last-formed chamber often light gray.

Diameter, up to 0.5 mm.

Distribution.—This is essentially an Arctic species, recorded from off Franz Josef Land and Nova Zembla, from northern Norway (Brady) a single station and single specimen off western Scotland (Heron-Allen and Earland) and off Prince Edward Island 50-100 fathoms (91–183 meters) and off the Cape Verde Islands, 1,070 fathoms (3,109 meters) (*Challenger*, Brady). Brady gives it from the estuary of the Dee and southwest of Ireland as rare, 40–100 fathoms (73–183 meters). Pearcey records it from two stations off the Falklands in 2¼ and 56 fathoms (4 and 102 meters). I have failed to find the species in the *Albatross* material.

TROCHAMMINA OCHRACEA (Williamson).

Plate 15, fig. 3.

Rotalina ochracea WILLIAMSON, Rec. Foram. Great Britain, 1858, p. 55, pl. 4, fig. 112; pl. 5, fig. 113.

Trochammina ochracea BALKWILL and MILLETT, Journ. Micr., vol. 3, 1884, p. 24, pl. 1, fig. 7.—MILLETT, Journ. Roy. Micr. Soc., 1899, p. 363, pl. 5, fig. 12.—SIDEBOTTOM, Mem. Proc. Manchester Lit. and Philos. Soc., vol. 49, pt. 2, No. 5, 1905, p. 5, pl. 1, fig. 8.—HERON-ALLEN and EARLAND, Proc. Roy. Irish, Acad., vol. 31, pt. 64, 1913, p. 51; Trans. Zool. Soc., London, vol. 20, 1915, p. 618, pl. 46, figs. 27, 28; Trans. Linn. Soc., London, vol. 11, pt. 13, 1916, p. 227.

Description.—Test small, thin, much compressed, trochoid, consisting of about two volutions; chambers about eight in the last-formed coil, sutures not depressed, evenly curved, those of the ventral side, slightly angled; wall finely arenaceous, almost translucent; aperture a narrow slit near the inner margin of the chamber; color yellowish brown.

Diameter, 0.25 mm.

Distribution.—Williamson's type material was from the Shetlands. It is known from other localities from about the British Isles, especially off Ireland and Scotland. I have seen no specimens of this species in the *Albatross* or other material that I have examined.

TROCHAMMINA PLICATA (Terquem).

Plate 15, fig. 4.

Patellina plicata Terquem, Ess. Anim. Plage Dunkerque, pt. 2, 1876, p. 72, pl. 8, figs. 9, *a*, *b*.

Trochammina plicata Balkwill and Wright, Journ. Micr., vol. 3, 1884, p. 26, pl. 1, fig. 8.—Halkyard, Trans. Ann. Rept. Manchester Micr. Soc., 1889, p. 69, pl. 1, fig. 11.—J. Wright, Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 469.—Millett, Journ. Roy. Micr. Soc., 1899, p. 363, pl. 5, fig. 13.—Heron-Allen and Earland, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 51; Trans. Zool. Soc. London, vol. 20, 1915, p. 619; Trans. Linn. Soc. London, vol. 11, pt. 13, 1916, p. 227.

This species has not occurred so far as I have seen in the *Albatross* or other American material. It is known from the vicinity of the British Isles off both Ireland and Scotland.

TROCHAMMINA BRADYI Robertson.

Plate 15, fig. 5.

Trochammina robertsoni H. B. Brady, Journ. Roy. Micr. Soc., 1887, p. 893.—J. Wright, Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 469, pl. 20, figs. 4*a*, *b*.—Goës, Köngl. Svensk. Vet. Akad., vol. 25, No. 9, 1894, p. 30, pl. 6, figs. 231–234.—Earland, Journ. Quekett Micr. Club, ser. 2, vol. 9, 1905, p. 203.—Heron-Allen and Earland, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 53; Trans. Linn. Soc., London, vol. 11, pt. 13, 1916, p. 228.

Trochammina bradyi Robertson, Ann. Mag. Nat. Hist., ser. 6, vol. 7, 1891, p. 388.

Description.—Test small, coiled, very low spired or planospiral, outer whorl consisting of about six chambers, those of the previous whorl slightly exposed in the umbilical region; chambers inflated, subspherical, sutures distinct and depressed; wall finely arenaceous, with much cement, smooth; aperture a narrow crescentiform slit at the base of the apertural face of the chamber; color yellowish brown.

Diameter, about 0.25 mm.

Distribution.—This species seems to be common in the waters of the British Isles, but has not so far been recorded from the western Atlantic.

The change of name from *T. robertsoni* to *T. bradyi* as proposed by Robertson is made necessary by definite rules of nomenclature. In this case the change simply means a reversal of the two names and should be made for conformity.

Although I have not seen specimens, the figures suggest that this may be *Haplophragmoides* rather than *Trochammina.*

TROCHAMMINA ROTALIFORMIS J. Wright.

Plate 16, figs. 1 and 2.

Trochammina inflata (Montagu), var., BALKWILL and WRIGHT, Trans. Roy. Irish Acad., vol. 28 (Science), 1885, p. 331, pl. 13, figs. 11, 12.

Trochammina rotaliformis J. WRIGHT, in Heron-Allen and Earland, Journ. Roy. Micr. Soc., 1911, p. 309.—HERON-ALLEN and EARLAND, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 52, pl. 3, figs. 11–13; Trans. Zool. Soc. London, vol. 20, 1915, p. 620.

Description.—Test small, trochoid, spire somewhat elevated, composed of about three volutions, gradually increasing in diameter; chambers distinct, four in each volution, sutures oblique and curved, slightly depressed, ventral side irregular, the last-formed chamber occupying nearly one-half the area of the test, smoothly finished; aperture elongate, at the base of the chamber in the umbilical region, with a sort of lip-like projection above; color reddish or yellowish brown.

Diameter, up to 0.45 mm.

Distribution.—This species is known from various localities about the British Isles, especially off Ireland, but has not been recorded from the western Atlantic.

TROCHAMMINA GLOBULOSA, new species.

Plate 16, figs. 3 and 4.

Description.—Test subglobose, trochoid, spire depressed, consisting of about three volutions, chambers rapidly increasing in size, four or five in the last-formed volution, chambers subglobose, sutures deep; wall finely arenaceous, with much cement, smoothly finished; aperture large, umbilicate, formed by the umbilicate region of the last volution and the arch of the last-formed chamber; color dark reddish brown, the last-formed chamber lighter in color.

Diameter, up to 1.25 mm.

Distribution.—Type specimen (U.S.N.M. No. 10625) from *Albatross* station D2383 in the Gulf of Mexico. There are several other stations for this species in the Gulf of Mexico and in the Caribbean and several off the northeastern coast of the United States.

The species is in some respects like *T. globigeriniformis*, but differs in the texture of the wall, the dark red color with dull, shining surface, and especially the form of the chambers and the very large umbilicate aperture. Its contour and aperture are very suggestive of certain of the trochoid species of *Globigerina*. Altogether it is a very distinct species in the western Atlantic material.

Trochammina globulosa—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
10621	U.S.N.M.	1	D2037...	38 53 00 N.; 69 23 30 W..	1,731	38	glob. oz.....	Rare.
10622	U.S.N.M.	2	D2038...	38 30 30 N.; 69 08 25 W..	2,033	....	glob. oz.....	Few.
10623	U.S.N.M.	5	D2041...	39 22 50 N.; 68 25 00 W..	1,608	38	glob. oz.....	Few.
10624	U.S.N.M.	10+	D2226...	37 00 00 N.; 71 54 00 W..	2,045	36.8	glob. oz.....	Common.
10625	U.S.N.M.	6	D2383...	28 32 00 N.; 88 06 00 W..	1,181	39.8	br. gn. m....	Few.
10626	U.S.N.M.	3	D2385...	28 51 00 N.; 88 18 00 W..	730	40.1	gy. m.......	Few.
10627	U.S.N.M.	1	D2392...	28 47 30 N.; 87 27 00 W..	724	40.7	br. gy. m....	Rare.
10628	U.S.N.M.	2	D2393...	28 43 00 N.; 87 14 30 W..	525	41.1	lt. gy. m....	Rare.
10629	U.S.N.M.	2	D2394...	28 38 30 N.; 87 02 00 W..	420	41.8	gn. m.......	Rare.
10630	U.S.N.M.	2	D2562...	39 15 30 N.; 71 25 00 W..	1,434	37.3	gy. oz.......	Rare.
10631	U.S.N.M.	1	D2581...	39 43 00 N.; 71 34 00 W..	394	....	gn. m.......	Rare.
10632	U.S.N.M.	2	D2682...	39 38 00 N.; 70 22 00 W..	1,004	....	gn. m. s.....	Rare.
10633	U.S.N.M.	1	H88.....	12 29 00 N.; 62 38 30 W..	1,630	....	m.bk.sp.f.r.	Rare.

TROCHAMMINA GLOBIGERINIFORMIS (Parker and Jones).

Plate 16, figs. 5 and 6.

Globigerina bulloides WILLIAMSON, Rec. Foram. Great Britain, 1858, p. 56, pl. 5, figs. 116–118 (not *G. bulloides* d'Orbigny, 1828).

Lituola nautiloidea, var. *globigeriniformis* PARKER and JONES, Philos. Trans., vol. 155, 1865, p. 407, pl. 15, figs. 46, 47.

Lituola (*Haplophragmium*) *globigeriniformis* TERRIGI, Att. Accad. Pont., 1880, p. 175, pl. 1, fig. 3.

Haplophragmium globigeriniforme SIDDALL, Cat. British Rec. Foram., 1879, p. 4.—W. B. CARPENTER, The Microscope, ed. 6, 1881, p. 561, fig. 320*a*, *b*.—H. B. BRADY, Denkschr. Akad. Wiss. Wien, vol. 43, 1881, p. 100; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 312, pl. 35, figs. 10–11.—BALKWILL and WRIGHT, Trans. Roy. Irish Acad., vol. 28, 1885, p. 329.—HAEUSLER, Abh. Schweiz. Pal. Ges., vol. 17, 1890, p. 36, pl. 4, figs. 13, 16, 17.—J. WRIGHT, Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 468.—TERRIGI, Mem. Roy. Com. Geol. Italia, vol. 4, 1891, p. 68, pl. 1, fig. 7.—CHAPMAN, Journ. Roy. Micr. Soc., 1892, p. 324, pl. 5, fig. 16.—EGGER, Abh. Bay. Akad. Wiss. München, vol. 18, 1893, p. 260, pl. 5, figs. 30, 31.—GOËS, Köngl. Svensk. Vet. Akad. Handl., vol. 25, No. 9, 1894, p. 22, pl. 5, figs. 128–133.—CHAPMAN, Proc. Zool. Soc. London, 1895, p. 16.—GOËS, Bull. Mus. Comp. Zoöl., vol. 29, 1896, p. 30.—FLINT, Rep. U. S. Nat. Mus., 1897 (1899), p. 277, pl. 21, fig. 1.—MILLETT, Journ. Roy. Micr. Soc., 1899, p. 361.—SIDEBOTTOM, Mem. and Proc. Manchester Lit. and Philos. Soc., vol. 49, No. 5, 1905, p. 4, pl. 1, fig. 6.—BAGG, Proc. U. S. Nat. Mus., vol. 34, 1908, p. 126.—HERON-ALLEN and EARLAND, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 46; Trans. Zool. Soc. London, vol. 20, 1915, p. 614; Trans. Linn. Soc. London, vol. 11, pt. 13, 1916, p. 224.

Trochammina globigeriniformis CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, pl. 24, figs. 193–195.—PEARCEY, Trans. Roy. Soc. Edinburgh, vol. 49, 1914, p. 1011.

Ammoglobigerina bulloides EIMER and FICKERT, Zeitschr. Wiss. Zool., vol. 65, 1899, p. 704.

Description.—Test free or adherent, spiral, trochoid, spire varying in its elevation, usually wider than high, chambers globose, all visible from above, only those of the last coil from below, sutures deeply depressed; test composed of from two to four volutions, the last-formed one usually of 3–5 chambers, rapidly increasing in size as added; wall of sand grains, the surface usually smooth; aperture an arched slit on the ventral side of the chamber at its contact with the adjacent chamber of the previous volution; color reddish brown, occasionally gray.

Diameter, 0.5–2 mm.

Distribution.—This is a very common and widely distributed species in deep, cold waters. The records cover well the Atlantic area where dredgings have been made. From the *Albatross* material it is most common in the cold area off the northeastern coast of the United States, but is found along the coast southward, in the Gulf of Mexico, the Caribbean, and off the coast of South America.

There is some variation in the height of the spire and in the relative amount of cement used in the construction of the test and therefore in its color.

The species belongs to the genus *Trochammina* as here considered, the difference in the height of the test being due to the globular character of the chambers. It is occasionally found attached and the test surrounded, as is usual with other fixed species of the genus, with an area of gray, finely granular particles. Such a fixed specimen is shown by Brady (pl. 35, fig. 11).

Trochammina globigeriniformis—*material examined.*

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°*F.*		
10566	U.S.N.M.	3	D2003...	37 16 30 N.; 74 20 36 W..	641	....	....	Few.
10567	U.S.N.M.	1	D2018...	37 12 22 N.; 74 20 04 W..	788	39	bu. m.......	Rare.
10568	U.S.N.M.	1	D2034...	39 27 10 N.; 69 56 20 W..	1,346	38	glob. oz.....	Rare.
10569	U.S.N.M.	8	D2037...	38 53 00 N.; 69 23 30 W..	1,731	38	glob. oz.....	Frequent.
10570	U.S.N.M.	10+	D2038...	38 30 30 N.; 69 08 25 W..	2,033	....	glob. oz.....	Frequent.
10571	U.S.N.M.	5	D2039...	38 19 26 N.; 68 20 20 W..	2,369	....	glob. oz.....	Common.
10572	U.S.N.M.	7	D2041...	39 22 50 N.; 68 25 00 W..	1,608	38	glob. oz.....	Common.
10573	U.S.N.M.	5	D2042...	39 33 00 N.; 68 26 45 W..	1,555	38.5	glob. oz.....	Common.
10574	U.S.N.M.	10+	D2043...	39 49 00 N.; 68 28 30 W..	1,467	38.5	glob. oz.....	Common.
10575	U.S.N.M.	3	D2052...	39 40 05 N.; 69 21 25 W..	1,098	45	glob. oz.....	Few.
10576	U.S.N.M.	1	D2089...	39 58 50 N.; 70 39 40 W..	168	45	gy. s.........	Rare.
10577	U.S.N.M.	3	D2096...	39 22 20 N.; 70 52 20 W..	1,451	37.5	glob. oz.....	Rare.
10578	U.S.N.M.	7	D2097...	37 58 20 N.; 70 57 30 W..	1,917	....	glob. oz.....	Few.
10579	U.S.N.M.	4	D2105...	37 50 00 N.; 73 03 50 W..	1,395	41	glob. oz.....	Few.
10580	U.S.N.M.	1	D2111...	35 09 50 N.; 74 57 40 W..	938	....	gn. m.......	Rare.
10581	U.S.N.M.	3	D2115...	35 49 30 N.; 74 34 45 W..	843	39	m., fne. s....	Few.
10582	U.S.N.M.	1	D2140...	17 36 10 N.; 76 46 05 W..	966	39.7	s.............	Rare.
10583	U.S.N.M.	1	D2150...	13 34 45 N.; 81 21 10 W..	382	45.75	nh. crs. s.....	Rare.
10584	U.S.N.M.	1	D2192...	39 46 30 N.; 70 14 45 W..	1,0[illegible]0	38.6	gy. oz.......	Rare.
10585	U.S.N.M.	1	D2203...	39 34 15 N.; 71 41 15 W..	705	38.9	gn. m. s.....	Rare.
10586	U.S.N.M.	2	D2204...	39 30 30 N.; 71 44 30 W..	728	39.1	br. m.......	Rare.
10587	U.S.N.M.	3	D2221...	39 05 30 N.; 70 44 30 W..	1,525	36.9	gy. oz.......	Few.
10588	U.S.N.M.	5	D2222...	39 03 15 N.; 70 50 45 W..	1,537	38.9	gy. oz.......	Few.
10589	U.S.N.M.	6	D2226...	37 00 00 N.; 71 54 00 W..	2,045	38.8	glob. oz.....	Few.
10590	U.S.N.M.	1	D2231...	38 29 00 N.; 73 09 00 W..	9[illegible]5	38.8	gy. oz.......	Rare.
10591	U.S.N.M.	1	D2234...	39 09 00 N.; 72 03 15 W..	810	38.6	gn. m.......	Rare.
10592	U.S.N.M.	2	D2335...	23 10 39 N.; 82 20 21 W..	204	....	....	Rare.
10593	U.S.N.M.	3	D2372...	29 15 30 N.; 85 29 30 W..	27	....	g.............	Rare.

Trochammina globigeriniformis—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°*F.*		
10594	U.S.N.M	5	D2381...	28 05 00 N.; 87 56 15 W..	1,330	....	lt. br. m.....	Few.
10595	U.S.N.M.	3	D2383...	28 32 00 N.; 88 06 00 W..	1,181	39.8	br. gn. m....	Few.
10596	U.S.N.M.	3	D2385...	28 51 00 N.; 88 18 00 W..	730	40.1	gy. m.......	Few.
10597	U.S.N.M.	1	D2525...	41 49 00 N.; 65 49 30 W..	72	43.6	s. g. brk. sh .	Rare.
10598	U.S.N.M.	1	D2542...	40 00 15 N.; 70 42 20 W..	129	47.2	s. brk. sh....	Rare.
10599	U.S.N.M.	4	D2550...	39 44 30 N.; 70 30 45 W..	1,081	38.5	br. m........	Few.
10600	U.S.N.M.	1	D2552...	39 47 07 N.; 70 35 00 W..	721	39.6	gy. oz........	Rare.
10601	U.S.N.M.	3	D2562...	39 15 30 N.; 71 25 00 W..	1,434	37.3	gy. oz........	Few.
10602	U.S.N.M.	3	D2564...	39 22 00 N.; 71 23 30 W..	1,390	37.3	gy. oz........	Few.
10603	U.S.N.M.	6	D2568...	39 15 00 N.; 68 08 00 W..	1,781	36.9	gy. oz........	Few.
10604	U.S.N.M.	1	D2570 ..	39 54 00 N.; 67 05 30 W..	1,813	36.8	glob. oz......	Rare.
10605	U.S.N.M.	1	D2573...	40 34 18 N.; 66 09 00 W..	1,742	37.3	gy. m. s......	Rare.
10606	U.S.N.M.	1	D2679...	32 40 00 N.; 76 40 30 W..	782	38.6	lt. gy. oz.....	Rare.
10607	U.S.N.M.	10+	D2682...	39 38 00 N.; 70 22 00 W..	1,004	....	gn. m. s......	Common.
10608	U.S.N.M.	3	D2705...	42 47 00 N.; 61 04 00 W..	1,255	....	lt. br. oz....	Few.
10609	U.S.N.M.	6	D2706...	41 28 30 N.; 65 35 30 W..	1,188	....	gy. oz. for...	Few.
10610	U.S.N.M.	2	D2710...	40 06 00 N.; 68 01 30 W..	984	....	gn. m........	Few.
10611	U.S.N.M.	2	D2761...	15 39 00 S.; 38 32 54 W..	818	39	pter. oz......	Few.
10612	U.S.N.M.	1	H47.....	17 46 30 N.; 65 10 25 W..	1,482	....	crs. co. s. brk. sh. for.	Rare.
10613	U.S.N.M.	1	H48.....	17 42 00 N.; 65 12 40 W..	978	....	co. oz. for...	Rare.

TROCHAMMINA NANA (H. B. Brady).

Plate 17, fig. 1.

Haplophragmium nanum H. B. Brady, Quart. Journ. Micr. Sci., vol. 21, 1881, p. 50; Denkschr. Akad. Wiss. Wien, vol. 43, 1881, p. 99, pl. 2, figs. 1, *a–c*. Ann. Mag. Nat. Hist., ser. 5, vol. 8, 1881, p. 406, pl. 21, fig. 1; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 311, pl. 35, figs. 6–8.—H. B. Brady, Parker, and Jones, Trans. Zool. Soc. London, vol. 14, 1888, p. 218, pl. 41, fig. 20.—Chapman, Journ. Roy. Micr. Soc., 1892, p. 324, pl. 5, fig. 15.—Egger, Abh. Bay. Akad. Wiss. München, vol. 18, 1893, p. 262, pl. 5, fig. 13–15.—Goës, Köngl. Svensk. Vet. Akad. Handl., vol. 25, No. 9, 1894, p. 22, pl. 5, figs. 124–127.—Millett, Journ. Roy. Micr. Soc., 1899, p. 360, pl. 5, fig. 9.—Rhumbler, Zool. Jahrb., vol. 24, 1906, p. 65, pl. 5, fig. 56.—Bagg, Proc. U. S. Nat. Mus., vol. 34, 1908, p. 127.—Awerinzew, Mem. Acad. Imp. Sci., St. Petersbourg, ser. 8, vol. 29, No. 3, 1911, p. 21.—Heron-Allen and Earland, Journ. Roy. Micr. Soc., 1911, p. 309, pl. 9, figs. 9–11.

Trochammina nana Cushman, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 123, figs. 190–192.—Pearcey, Trans. Roy. Soc. Edinburgh, vol. 49, 1914, p. 1010.

Description.—Test small, trochoid, spire depressed, consisting of about two volutions, the last with six or seven chambers, periphery rounded, umbilicate below; chambers inflated, subglobose, somewhat flattened above, sutures distinct; wall arenaceous, thin, smoothly finished; aperture a narrow curved opening at the base of the chamber; color light brown except the last-formed chamber, which is usually gray.

Diameter up to 0.34 mm.

Distribution.—This species seems characteristic of cold or deep waters. It is known from the Arctic, off Franz Josef Land, where it is recorded as "exceedingly abundant at depths from 89–145 fathoms

(163–265 meters)," and on the west shores of Nova Zembla. It is recorded at a few stations off Africa and South America and by Pearcey from the South Atlantic. Awerinzew records it from the Siberian Arctic.

I have not found it in the *Albatross* material, but did find it in the Canadian Arctic Expedition material from the Arctic.

TROCHAMMINA SUBTURBINATA, new species.

Plate 16, figs. 7 and 8.

Description.—Test subglobose, trochoid, spire very low or even sunken, somewhat umbilicate, composed of two or three volutions; chambers inflated, usually five or six in the last-formed volution, sutures distinct and depressed; wall coarsely arenaceous, but the surface smoothly finished but not polished; aperture semicircular or variously shaped, at the base of the chamber; color yellowish brown. Diameter up to 1.5 mm.

Distribution.—Type specimen (U.S.N.M. No. 10646) from *Albatross* station D2140 in the Caribbean Sea. Other specimens are from the same region, the Gulf of Mexico, and from the northeastern coast of the United States.

This species may be distinguished from *T. globulosa* at once by its texture, color, and less umbilicate form, from *T. globigeriniformis* by its flattened spire and greater number of chambers in the whorl and from *T. turbinata* by its coarser texture and more regular shape. The aperture may be semicircular or in some cases has a lip extending in and nearly dividing it into separate openings.

Trochammina subturbinata—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		° F.		
10643	U.S.N.M.	6	D2036...	38 52 40 N.: 69 24 40 W..	1,735	38	glob. oz.....	Frequent.
10644	U.S.N.M.	8	D2038...	38 30 30 N.: 69 08 25 W..	2,033	....	glob. oz.....	Frequent.
10645	U.S.N.M.	10+	D2039...	38 19 26 N.: 68 20 20 W..	2,369	....	glob. oz.....	Common.
10646	U.S.N.M.	1	D2140...	17 36 10 N.: 76 46 05 W..	966	39.7	s............	Rare.
10647	U.S.N.M.	10+	D2226...	37 00 00 N.: 71 54 00 W..	2,045	36.8	glob. oz.....	Common.
10648	U.S.N.M.	10+	D2383...	28 32 00 N.: 88 06 00 W..	1,181	39.8	br. gn. m....	Common.
10649	U.S.N.M.	5	D2568...	39 15 00 N.: 68 08 00 W..	1,781	36.9	gy. oz.......	Few.
10650	U.S.N.M.	1	H79.....	14 20 30 N.: 63 10 00 W..	821	....	co. s. sh. for.	Rare.
10651	U.S.N.M.	1	H82.....	13 29 00 N.: 62 42 40 W..	1,051	....	for. m. bk. sp	Rare.
10652	U.S.N.M.	1	H88.....	12 29 00 N.: 62 38 30 W..	1,630	....	m. bk. sp. for	Rare.

TROCHAMMINA TURBINATA (H. B. Brady).

Plate 17, fig 2.

Haplophragmium turbinatum H. B. BRADY, Quart. Journ. Micr. Sci., vol. 21, 1881, p. 50; Rep. Voy. *Challenger*, Zoology. vol. 9, 1884, p. 312, pl. 35, figs. 9, *a–c*.—EGGER, Abh. Bay. Akad. Wiss. München, vol. 18, 1893, p 262, pl. 5, figs. 57–59.—CHAPMAN, Proc. Zool. Soc. London, 1895, p 16.

Trochammina turbinatum Eimer and Fickert, Zeitschr. Wiss. Zool., vol. 65. 1899, p. 695.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 122, fig. 189.—Pearcey, Trans. Roy. Soc. Edinburgh, vol. 49, 1914, p. 1011.

Haplophragmium obsoletum Goës, Bull. Mus. Comp. Zoöl., vol. 29, 1896, p. 31, pl. 3, figs. 14–16.

Description.—Test spiral, early portion regular, low spired, last-formed volution in the adult somewhat irregular and becoming oblique; five to eight chambers in the last-formed volution, umbilicate below, in adults with a depression above due to the obliquity of the last-formed volution; wall arenaceous, variable in coarseness and amount of cement; aperture a narrow curved slit at the base of the ventral side of the chamber; color yellowish or reddish brown or gray.

Diameter 0.75–1.50 mm.

Distribution.—The original *Challenger* records included but one Atlantic station, 346 in 2,350 fathoms (4,298 meters) just south of the equator off the west coast of Africa. Later *Challenger* records include stations 44 in 1,240 fathoms (2,268 meters) off the northeast coast of the United States, 323 in 1,900 fathoms (3,475 meters) off Buenos Aires, and 348 near the first station in 2,450 fathoms (4,481 meters). There are also two stations 142 and 143 off the Cape of Good Hope. Pearcey records it from the South Atlantic and Antarctic in 2,103 and 2,500 fathoms (3,846 and 4,572 meters).

The *Albatross* material has this species from numerous stations from the northeastern coast of the United States and the Gulf of Mexico a few of the stations in comparatively shallow water but half of them average more than 1,500 fathoms (2,743 meters). Examination of the Goës collection shows *Haplophragmium obsoletum* Goës is really *T. turbinatum* although the figures are somewhat conventionalized.

Trochammina turbinata—*material examined.*

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		° F.		
10552	U.S.N.M.	9	D2018	37 12 22 N.: 74 20 04 W.	788	39	bu. m	Common.
10553	U.S.N.M.	1	D2037	38 53 00 N.: 69 23 30 W.	1,731	38	glob. oz	Rare.
10554	U.S.N.M.	1	D2041	39 22 50 N.: 68 25 00 W.	1,608	38	glob. oz	Rare.
10555	U.S.N.M.	1	D2089	39 58 50 N.: 70 39 40 W.	168	45	gy. s	Rare.
10556	U.S.N.M.	7	D2097	37 56 20 N.: 70 57 30 W.	1,917		glob. oz	Few.
10557	U.S.N.M.	2	D2160	23 10 31 N.: 82 20 37 W.	167		co	Few.
10558	U.S.N.M.	4	D2221	39 05 30 N.: 70 44 30 W.	1,525	35.9	gy. oz	Few.
10559	U.S.N.M.	3	D2222	39 03 15 N.: 70 50 45 W.	1,537	36.9	gy. oz	Few.
10560	U.S.N.M.	1	D2229	37 38 40 N.: 73 16 30 W.	1,423	37.7	glob. oz	Rare.
10561	U.S.N.M.	1	D2231	38 29 00 N.: 73 09 00 W.	965	35.8	gy. oz	Rare.
10562	U.S.N.M.	1	D2372	29 15 30 N.: 85 29 30 W.	27		g	Rare.
10563	U.S.N.M.	1	D2550	39 44 30 N.: 70 30 45 W.	1,081	38.5	br. m	Rare.
10564	U.S.N.M.	1	D2562	39 15 30 N.: 71 25 00 W.	1,434	37.3	gy. oz	Rare.
10565	U.S.N.M.	1	D2581	39 43 00 N.: 71 34 00 W.	394		gn. m	Rare.

TROCHAMMINA CONGLOBATA H. B. Brady.

Plate 17, fig. 3.

Trochammina conglobata H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 341, pl. 40, figs. 8, 9.—Goës, Bull. Mus. Comp. Zoöl., vol. 29, 1896, p. 33.—Flint, Ann. Rep. U. S. Nat. Mus., 1897 (1899), p. 281, pl. 26, fig. 2.

Description.—Test convoluted, subglobular, composed of an irregularly coiled test, the coils in a constantly changing direction but close coiled, chambers distinct, of unequal size, inflated; wall finely arenaceous with abundant cement, smooth; aperture a narrow slit at the base of the last-formed chamber; color yellowish brown.

Diameter 1–2 mm.

Distribution.—This species is known only from the western Atlantic, the known range being from the Gulf of Mexico to the coast of Brazil with the following records: *Challenger* 23, in 450 fathoms (823 meters) off Sombrero Island, West Indies; 120 in 675 fathoms (1,234 meters) off Pernambuco, Brazil. Goes records it from *Albatross* H515 in 769 fathoms (1,406 meters) off western Cuba and D2355 in 399 fathoms (730 meters) off Yucatan. Flint records it from D2395 in 347 fathoms (635 meters) in the Gulf of Mexico. I have seen additional material from D2760 in 1,019 fathoms (1,864 meters) off Bahia, Brazil, and H215 off the southeastern coast of Cuba.

The species is in some respects allied to *Haplophragmoides coronata* especially in the character of the wall. From its coiled condition it might as well be placed in *Haplophragmoides* but I have left it in *Trochammina* for the present.

Its range corresponds to that of a number of other species; Gulf of Mexico, the West Indies and Caribbean and the tropical coast of South America.

Trochammina conglobata—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
10653	U.S.N.M.	1	D2355...	20 56 48 N.; 86 27 00 W..	399	....	yl. cz........	Rare.
10654	U.S.N.M.	5	D2760...	12 07 00 S.; 37 17 00 W..	1,019	39.5	br. co.......	Few.
10699	U.S.N.M.	3	H215....	18 54 30 N.; 75 16 30 W..	1,486	....	yl. m. brk. sh. fr.	Few.

Genus GLOBOTEXTULARIA Eimer and Fickert, 1899.

Haplophragmium (part) H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 313.

Globotextularia Eimer and Fickert, Zeitschr. Wiss. Zool., vol. 65, 1899, p. 679. (Type, *G. anceps* (H. B. Brady)).—Cushman, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 125.

Description.—Test arenaceous, the early chambers in a spire, the later ones irregular, globular, *Globigerina*-like, containing only the following species:

GLOBOTEXTULARIA ANCEPS (H. B. Brady).

Plate 17, fig. 4.

Haplophragmium anceps H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 313, pl. 35, figs. 12–15.—Chaster, First Rep. Southport Soc. Nat. Sci., 1890–91 (1892), p. 57, pl. 1, fig. 2.—Millett, Proc. Roy. Micr. Soc., 1899, p. 361, pl. 5, fig. 10.—Earland, Journ. Quekett Micr. Club, ser. 2, vol. 9, 1905, p. 200; Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 47, pl. 3, fig. 4; Trans. Zool. Soc. London, vol. 20, 1915, p. 615.

Globotextularia anceps Eimer and Fickert, Zeitschr. Wiss. Zool., vol. 65, 1899; p. 679, fig. 25 (in text).—Cushman, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 125, fig. 196.—Pearcey, Trans. Roy. Soc. Edinburgh, vol. 49, 1914, p. 1011.

Description.—Test irregular, early portion spiral, with a high spire, compact, later portion with much larger globular chambers, somewhat irregularly placed, typically four in the last volution, inflated; sutures distinct and depressed; wall arenaceous with a fairly smooth surface; aperture near the inner end of the chamber; color various shades of brown.

Diameter, up to 1.5 mm.

Distribution.—The most northerly record for this species is in 1,750 fathoms (3,200 meters) in Davis Strait. The other *Challenger* records give it as far south as nearly 40° S. in the South Atlantic and Pearcey gives a *Scotia* record southeast of the Falklands. Its extent, then, in the Atlantic is wide.

About the British Isles it was found by Chaster at Southport and in the Irish Sea, by Earland at Bognor, and by Heron-Allen and Earland in the Clare Island region on the west coast of Ireland.

I have had *Albatross* material from but four stations, all off the northeastern coast of the United States.

Globotextularia anceps—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
10617	U.S.N.M.	6	D2035	39 26 16 N.; 70 02 37 W.	1,362	....	glob. oz	Few.
10618	U.S.N.M.	1	D2039	38 19 26 N.; 68 20 20 W.	2,369	....	glob. oz	Rare.
10619	U.S.N.M.	7	D2226	37 00 00 N.; 71 54 00 W.	2,045	36.8	glob. oz	Few.
10620	U.S.N.M.	2	D2581	39 43 00 N.; 71 34 00 W.	394	....	gn. m	Rare.

Genus AMMOCHILOSTOMA Eimer and Fickert, 1899.

Trochammina (part) H. B. Brady, Quart. Journ. Micr. Sci., vol. 19, 1879, p. 58, vol. 21, 1881, p. 52; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 344.—Chapman, The Foraminifera, 1902, p. 151.

Haplophragmium (part) H. B. BRADY, Quart. Journ. Micr. Sci., vol. 21, 1881, p. 50; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 312.—CHAPMAN, The Foraminifera, 1902, p. 138.

Ammochilostoma (part) EIMER and FICKERT, Zeitschr. Wiss. Zool., vol. 65, 1899, p. 692.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 126.—(Type, *A. pauciloculata* (H. B. Brady)= *Trochammina pauciloculata* H. B. Brady.)

Description.—Test free, early chambers spiral, later ones very involute, and the last-formed volution often entirely covering the previously formed chambers and usually at an oblique angle to the earlier growth; wall arenaceous, with a variable, usually excessive amount of cement; aperture at or near the base of the apertural face of the chamber, elongate, narrow, color usually reddish or yellowish brown.

This name was proposed by Eimer and Fickert for three species of *Trochammina*, *T. ringens*, *T. galeata*, and *T. pauciloculata.* As the first of these species has already been included under *Haplophragmoides*, this name, *Ammochilostoma*, may be used for the other two species with others which in their last-formed volution become involute or irregularly winding about the test in a changing plane.

AMMOCHILOSTOMA GALEATA (H. B. Brady).

Trochammina galeata H. B. BRADY, Quart. Journ. Micr. Sci., vol. 21, 1881, p. 52; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 344, pl. 40, figs. 19–23.—EGGER, Abh. Bay. Akad. Wiss. München, vol. 18, 1893, p. 265, pl. 5, figs. 32–34.—GOËS, Bull. Mus. Comp. Zoöl., vol. 29, 1896, p. 33.

Ammochilostoma galeata EIMER and FICKERT, Zeitschr. Wiss. Zoöl., vol. 65, 1899, p. 692, fig. 39 (in text).—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 127, figs. 198–201.—PEARCEY, Trans. Roy. Soc. Edinburgh, vol. 49, 1914, p. 1011.

Description.—Test subglobular, at least the early chambers spiral and enveloped by the later ones, the last-formed chamber in the adult forming at least half the area of the test; wall finely arenaceous with much cement, smooth; aperture a narrow slit slightly above the base of the apertural face, with slightly protuberant lips; color yellowish brown.

Diameter, 0.5 mm.

Distribution.—There are five Atlantic *Challenger* stations for this species, all but one in 2,200 fathoms (4,024 meters) or more. One, station 24, is off Culebra Island, West Indies, in 390 fathoms (713 meters), the others from deep waters north of the Cape Verde Islands southward to the middle South Atlantic to nearly 40° S. latitude. Pearcey records it from *Scotia* station 459 in 1,998 fathoms (3,654 meters) in mid-Atlantic at 41° 30′ S.

Goës records it from a single *Albatross* station D2383 in 1,181 fathoms (2,160 meters) in the Gulf of Mexico and mentions the Caribbean but gives no station. There is no material of this species in the Goës collection so far as I have been able to determine.

I have had typical specimens from a single *Albatross* station D2568 off the northeastern United States in 1,781 fathoms (3,257 meters).

Ammochilostoma galeata—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
10526	U.S.N.M.	2	D2568...	° ′ ″ ° ′ ″ 39 15 00 N.; 68 08 00 W..	1,781	°F. 36.9	gy. oz.......	Rare.

AMMOCHILOSTOMA PAUCILOCULATA (H. B. Brady).

Trochammina pauciloculata H. B. BRADY, Quart. Journ. Micr. Sci., vol. 19, 1879, p. 58, pl. 5, figs. 13-14; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 344, pl. 41, figs. 1, 2.—EGGER, Abh. Bay. Akad. Wiss. München, vol. 18, 1893, p. 265, pl. 5, figs. 37, 38.—GOËS, Bull. Mus. Comp. Zoöl., vol. 29, 1896, p. 33.—FLINT, Ann. Rep. U. S. Nat. Mus., 1897 (1899), p. 282, pl. 27, fig. 2.—BAGG, Proc. U. S. Nat. Mus., vol. 34, 1907, p. 128.

Ammochilostoma pauciloculata EIMER and FICKERT, Zeitschr. Wiss. Zool., vol. 65, 1899, p. 692.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 126, fig. 197.—PEARCEY, Trans. Roy. Soc. Edinburgh, vol. 49, 1914, p. 1011.

Description.—Test ovoid, early chambers spiral, hidden by the later chambers which are in a plane oblique to the early ones and very involute, inflated, only three or four chambers visible in adult specimens, sutures distinct, depressed; wall finely arenaceous with an excess of cement, surface smooth and polished; aperture an elongate, somewhat arched slit at the base of the chamber; color yellowish or reddish brown, with some of the chambers gray in occasional specimens.

Diameter up to 7.5 mm.

Distribution.—This is a widely distributed species especially in deep cold waters. The *Challenger* records show its distribution from 40° N. to 40° S. at depths ranging from 390 to 2,450 fathoms (713 to 4,481 meters). Pearcey records it from the *Scotia* stations in the South Atlantic 1,998 to 2,103 fathoms (3,654 to 3,846 meters). Egger records it from one *Gazelle* station off the west coast of Africa.

Flint has the species in the *Albatross* material from two stations—D2313 off the Carolina coast and D2568 off Marthas Vineyard—99 and 1,781 fathoms (181 and 3,257 meters).

I have found it as occasional specimens in *Albatross* material from the northeastern coast of the United States, off the coast of Cuba, and in the Caribbean at depths ranging from 167 to 1,806 fathoms (305 to 3,303 meters). At none of these stations could it be called anything but rare, as only occasional specimens were met with.

It is a species that can hardly be mistaken for any other. In some specimens the last formed chamber has a gray color instead of the usual yellowish brown.

Ammochilostoma pauciloculata—*material examined.*

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
10527	U.S.N.M.	2	D2034...	39 27 10 N.; 69 56 20 W..	1,346	38	glob. oz.....	Few.
10528	U.S.N.M.	3	D2052...	39 40 05 N.; 69 21 25 W..	1,098	45	glob. oz.....	Few.
10529	U.S.N.M.	1	D2160...	23 10 31 N.; 82 20 37 W..	167	....	co...........	Rare.
10530	U.S.N.M.	1	D2202...	39 38 00 N.; 71 39 45 W..	515	39.1	gn. m.......	Rare.
10531	U.S.N.M.	1	D2204...	39 30 30 N.; 71 44 30 W..	728	39.1	br. m.......	Rare.
10532	U.S.N.M.	7	D2205...	39 35 00 N.; 71 18 45 W..	1,073	38.1	gy. oz.......	Few.
10533	U.S.N.M.	3	D2221...	39 05 30 N.; 70 44 30 W..	1,525	36.9	gy. oz.......	Few.
10536	U.S.N.M.	4	D2550...	39 44 30 N.; 70 30 45 W..	1,081	38.5	br. m.......	Few.
10534	U.S.N.M.	1	D2568...	39 15 00 N.; 68 08 00 W..	1,781	36.9	gy. oz.......	Rare.
10535	U.S.N.M.	1	D2573...	40 34 18 N.; 66 09 00 W..	1,742	37.3	gy.m.s......	Rare.
10537	U.S.N.M.	4	D2706...	41 28 30 N.; 65 35 30 W..	1,188	....	gy.oz.for....	Few.
10538	U.S.N.M.	1	H82.....	13 29 00 N.; 62 42 40 W..	1,051	....	for. m. bk. sp.	Rare.
10539	U.S.N.M.	1	H131....	12 04 00 N.; 66 16 40 W..	1,806	....	choc. oz. for..	Rare.

Genus AMMOSPHAEROIDINA Cushman, 1910.

Haplophragmium (part) H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 313.—Howchin, Trans. Roy. Soc. South Australia, vol. 12, 1889, p. 6.—Chapman, The Foraminifera, 1902, p. 138: Journ. Linn. Soc., Zool., vol. 30, 1907, p. 24.

Ammosphaeroidina Cushman, Bull. 71, U. S. Nat Mus., pt. 1, 1910, p. 128.—(Type, *Haplophragmium sphaeroidiniformis* H. B. Brady).

Description.—Test globose, arenaceous, early portion spiral, later chambers like *Sphaeroidina* in form, embracing; aperture rounded, at one side of the chamber in the adult.

This genus in its general external characters much resembles *Sphaeroidina*, but has a rather coarse arenaceous test.

AMMOSPHAEROIDINA SPHAEROIDINIFORMIS (H. B. Brady).

Plate 17, fig. 5.

Haplophragmium sphaeroidiniformis H. B. Brady, Rep. Voy. *Challenger*, Zoology, 1884, p. 313.—Howchin, Trans. Roy. Soc. South Australia, vol. 12, 1889, vol. 9, p. 6.—Chapman, Journ. Linn. Soc., Zool., vol. 30, 1907, p. 24, pl. 3, figs. 50, 51; vol. 30, 1910, p. 401.

Ammosphaeroidina sphaeroidiniformis Cushman, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 128, fig. 202.—Cushman, Proc. U. S. Nat. Mus., vol. 56, 1919, p. 600.

Description.—Test free, subglobose, early portion spiral, later portion in adult specimens typically made up of three large globose chambers similar in form and arrangement to *Sphaeroidina bulloides*, one large one at one side and two smaller ones at the other, the aperture at the inner side of the last-formed chamber, semicircular or rounded; wall rather coarsely arenaceous; color brownish or gray. Diameter, 0.75–1.75 mm.

Distribution.—The *Albatross* stations here given are along the eastern coast of the United States, in the Gulf of Mexico, and in the Caribbean.

The species has undoubtedly been confused with *Trochammina globigeriniformis* in many earlier records. The original specimens were from the Mediterranean. It is recorded from the Tertiary of Australia (Chapman) and as a recent species from off Funafuti (Chapman) and in the North Pacific (Cushman).

Ammosphaeroidina sphaeroidiniformis—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
10540	U.S.N.M.	1	D2046...	40 02 49 N.; 68 49 00 W..	407	40	bu. m.......	Rare.
10541	U.S.N.M.	2	D2110...	35 12 10 N.; 74 57 15 W..	516	40	bu. m.......	Rare.
10542	U.S.N.M.	1	D2115...	35 49 30 N.; 74 34 45 W..	843	39	m. fne. s....	Rare.
10543	U.S.N.M.	1	D2150...	13 34 45 N.; 81 21 10 W..	382	45.75	wh. crs. s....	Rare.
10544	U.S.N.M.	1	D2399...	28 44 00 N.; 86 18 00 W..	196	51.6	gv. m.......	Rare.
10545	U.S.N.M.	1	D2530...	40 53 30 N.; 66 24 00 W..	956	38.4	gv. oz.......	Rare.
10546	U.S.N.M.	1	D2568...	39 15 00 N.; 68 08 00 W..	1,781	36.9	gv. oz.......	Rare.
10614	U.S.N.M.	8	D2677...	32 39 00 N.; 76 50 30 W..	478	39.3	gn. m.......	Few.
10547	U.S.N.M.	3	H82.....	13 29 00 N.; 62 42 40 W..	1,051	....	for. m. bk. sp.	Few.

Subfamily Neusininae.

Genus BOTELLINA W. B. Carpenter, 1869.

Botellina W. B. Carpenter, Proc. Roy. Soc. London, vol. 18, 1869, p. 444. (Type, *B. labyrinthica*, H. B. Brady).—Bütschli, in Bronn, Klassen und Ordnungen Thierreichs, vol. 1, 1880, p. 193.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 279.—Rhumbler, Arch. Prot., vol. 3, 1903, p. 261.—Pearcey, Trans. South African Philos. Soc., vol. 17, pt. 2, 1908, p. 188.

Description.—For the generic description, see under *B. labyrinthica* which immediately follows.

BOTELLINA LABYRINTHICA H. B. Brady.

Plate 18, figs. 1–4.

Botellina, species, W. B. Carpenter, Proc. Roy. Soc. London, vol 18, 1869, p. 444.

Botellina labyrinthica H. B. Brady, Quart. Journ. Micr. Sci., vol. 21, 1881, p. 48, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 279, pl. 29, figs. 8–18.—Goës; Köngl. Svensk. Vet. Akad. Handl., vol. 25, No. 9, 1894, p. 19, pl. 4, figs. 69–86.—Schaudinn, Bergens Mus. Aarbog, 1894–95, No. 9, p. 5.—Chapman, The Foraminifera, 1902, p. 128, pl. 6, fig. 1.—Rhumbler, Arch. Prot., vol. 3, 1903, p. 261, fig. 103 (in text).—Heron-Allen and Earland, Trans. Linn. Soc. London, vol. 11, pt. 13, 1910, p. 221.

Description.—"Test arenaceous, cylindrical, straight or slightly curved, somewhat irregular in outline, one end rounded and more or less swollen (the natural condition of the other end not certainly known); walls of the test of firm consistence, rough, without external fine cement, subdivided irregularly by a labyrinth of sand grains cemented together at various angles forming rude chamberlets which open out into a main tube or chamber, which runs through nearly the whole test.

Incomplete specimens only known."

Type species.—*Botellina labyrinthica* H. B. Brady.

The above is the generic description given by Pearcey based on the type species. Pearcey obtained another species of *Botellina* from South Africa which seems to show that this may really be a many chambered genus and if so should probably be placed with *Neusina* in the subfamily already made for that genus. The chamberlet condition in the two is similar in certain respects.

Length of *B. labyrinthica* 25 mm. or more.

Distribution.—Type locality, *Porcupine* station 51, latitude 60° 6′ N.; longitude 8° 14′ W. in 440 fathoms (805 meters), bottom temperature 42° F. There are a few specimens in the United States National Museum No. 6247 from this station received from Dr. W. B. Carpenter. Other records are in the same general region. The specimens figured by Goës under this name are not this species or at least do not show the full characters. Schaudinn records the species from Bergen, Norway, but figures no specimens. Pearcey notes the following records—"It was again met with by the Naturalists of the *Knight Errant* and *Triton* expeditions in 1880 and 1882, but always in a fragmentar ycondition in the same areas [as the type station, Faroe Channel] at a depth of 516 fathoms (944 meters) in the warm area, and in 580 fathoms (1,061 meters) in the cold area with a bottom temperature 46.5° and 31° F. (8 and —0.5° C.), respectively. It would thus appear to be more common in the cold area, where it was taken in the greatest abundance, strongly indicating that it favors a low temperature."

"In 1886 Mr. Joseph Wright, F. G. S. (J. Wright, second dredging cruise of the S. S. *Protector*, Belfast Nat. Field Club, 1886) again records *B. labyrinthica* as having been obtained in considerable abundance in a dredging taken about midway between Belfast Lough and Port Patrick, at a depth of 100 fathoms (183 meters) and again in September, 1902 [1] (from washings of dredged material from Rathlin Sound, Church Bay, in 17–24 fathoms (31–44 meters), but he makes no mention of the temperature of the water."

Heron-Allen and Earland obtained fragments of this species at two *Runa* stations off the west of Scotland in 30 and 60 fathoms (55 and 110 meters).

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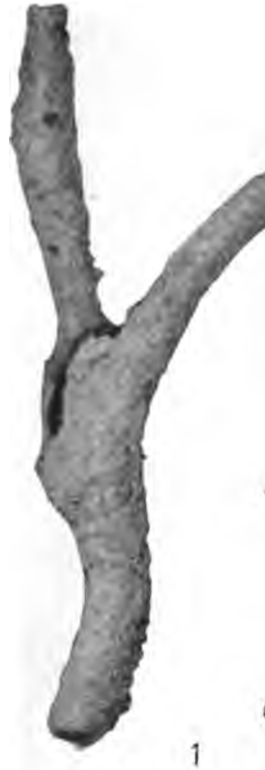
[1] J. Wright, Foraminifera from Rathlin Island, Irish Nat., vol. 11, pp. 210–213.

EXPLANATION OF PLATES.

Plate 1.

Fig. 1. *Aschemonella ramuliformis.* × 15. D2150, U.S.N.M. No. 10642.
2. *Aschemonella catenata.* × 20. D2226, U.S.N.M. No. 10140*a*.
3. *Aschemonella catenata.* × 20. D2226, U.S.N.M. No. 10140*b*.
4. *Aschemonella catenata.* × 20. D2226, U.S.N.M. No. 10140*c*.
5. *Reophax scorpiurus.* × 25. Montego Bay, Jamaica.
6. *Reophax scorpiurus.* × 25. *Goldseeker*, U.S.N.M. No. 10198*b*.
7. *Reophax scorpiurus.* × 20. D2531, U.S.N.M. No. 10196*a*.



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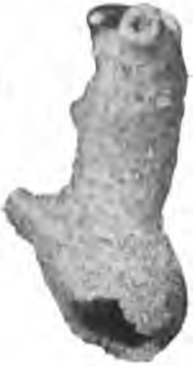

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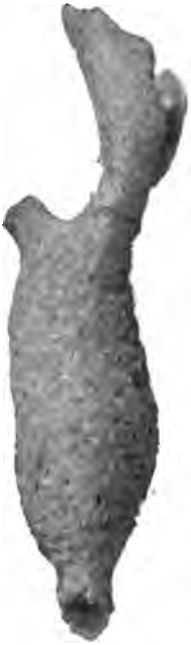

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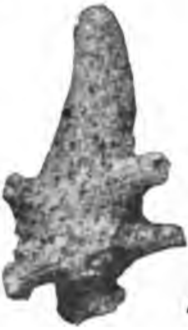

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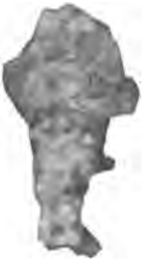

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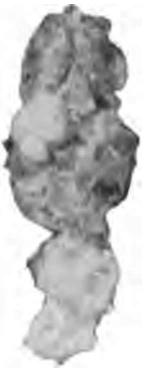

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LITUOLIDAE OF THE ATLANTIC OCEAN.

FOR EXPLANATION OF PLATE SEE PAGE 90.

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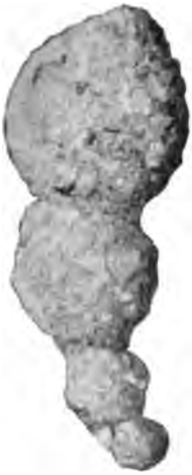

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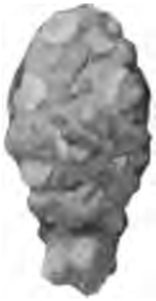

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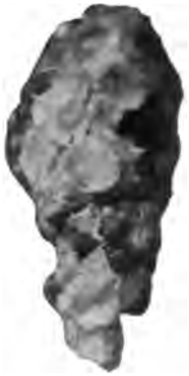

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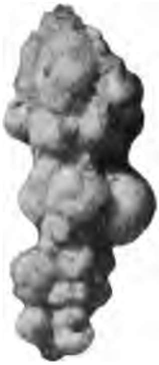

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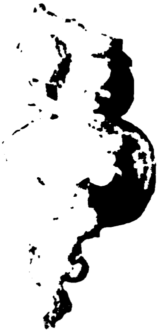

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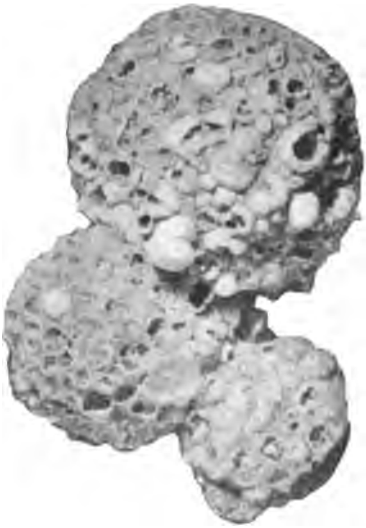

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LITUOLIDAE OF THE ATLANTIC OCEAN.

FOR EXPLANATION OF PLATE SEE PAGE 91.

PLATE 2.

FIG. 1. *Reophax pilulifer.* × 20. D2097, U.S.N.M. No. 10184*a*.
2. *Reophax curtus.* × 20. D2458, U.S.N.M. No. 10669*b*.
3. *Reophax curtus.* × 25. D2458, U.S.N.M. No. 10669*a*.
4. *Reophax agglutinatus.* × 20. D2550, U.S.N.M. No. 10667.
5. *Reophax agglutinatus.* × 20. D2550, U.S.N.M. No. 10667*a*.
6. *Reophax agglutinatus*, var. *glomeratus.* × 10. D2043, U.S.N.M. No. 10656*c*.

PLATE 3.

FIG. 1. *Reophax agglutinatus*, var. *glomeratus*. × 10. D2043, U.S.N.M. No. 10656*a*.

2. *Reophax agglutinatus*, var. *glomeratus*. × 10. D2043, U.S.N.M. No. 10657*a*.

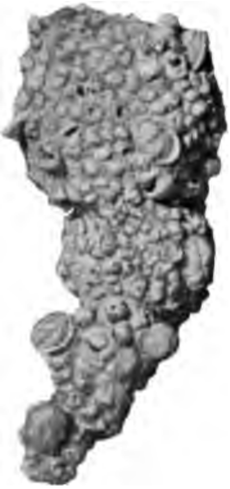
3. *Reophax bilocularis*. × 20. D2679, U.S.N.M. No. 10135*b*.

4. *Reophax bilocularis*. × 15. D2679, U.S.N.M. No. 10135*a*.

5. *Reophax distans*. × 20. D2568, U.S.N.M. No. 10116*a*.

6. *Reophax distans*. × 25. D2568, U.S.N.M. No. 10116*b*.

7. *Reophax guttifer*. × 20. D2038, U.S.N.M. No. 10201.



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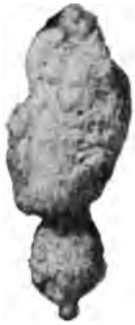

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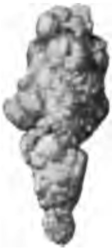

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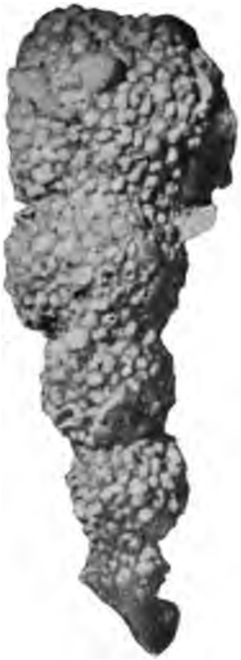

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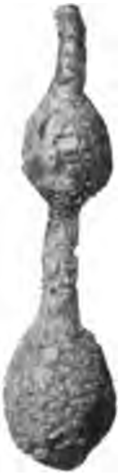

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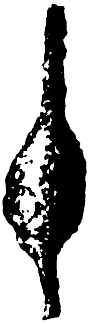

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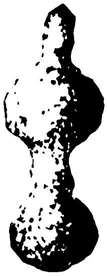

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LITUOLIDAE OF THE ATLANTIC OCEAN.

FOR EXPLANATION OF PLATE SEE PAGE 92.

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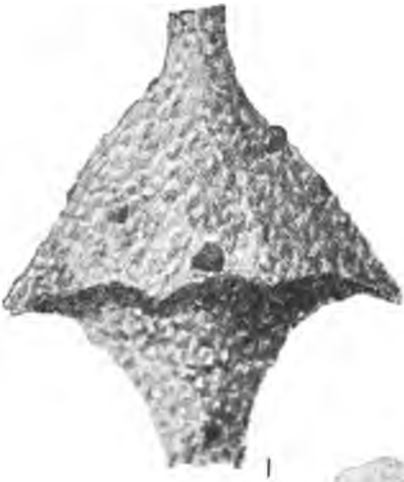
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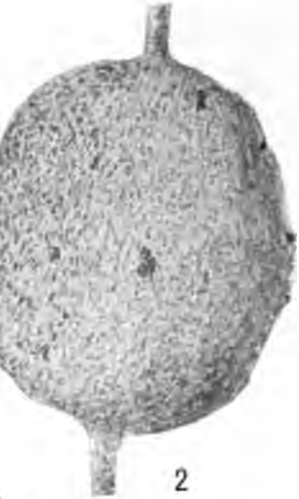
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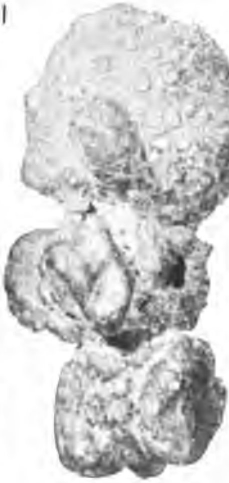
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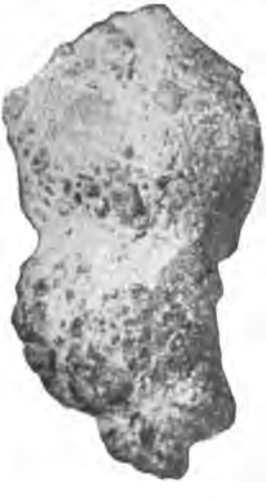
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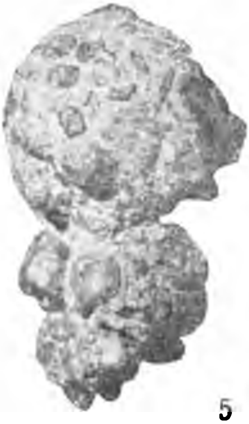
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LITUOLIDAE OF THE ATLANTIC OCEAN.

FOR EXPLANATION OF PLATE SEE PAGE 93.

PLATE 4.

FIG. 1. *Reophax distans*, var. *turbo*. × 75.

2. *Reophax distans*, var. *delicatulus*. × 150.

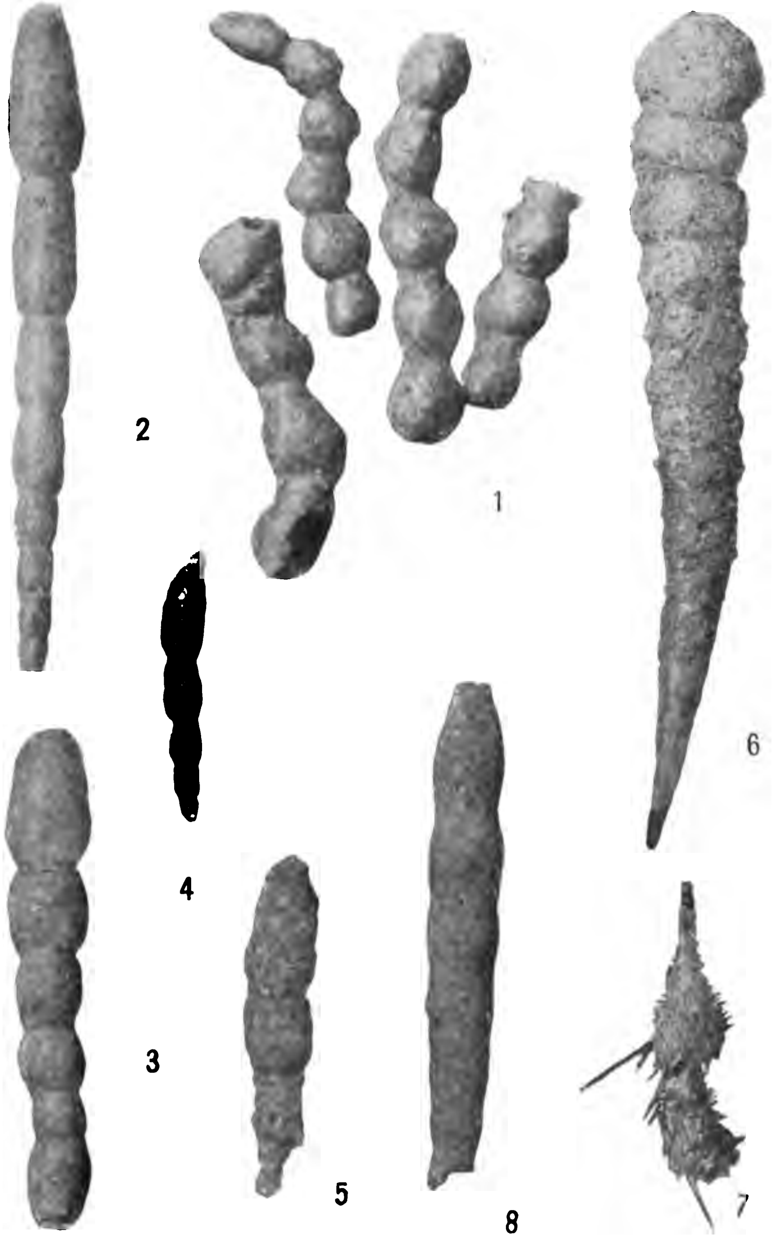
3. *Reophax robustus*, var. *septentrionalis*. × 10. D2084, U. S.N.M. No. 10662.

4. *Reophax robustus*, var. *septentrionalis*. × 10. D2572, U.S.N.M. No. 10663*a*.

5. *Reophax robustus*, var. *septentrionalis*. × 10. D2572. U.S.N.M. No. 10663.

PLATE 5.

FIG. 1. *Reophax aduncus.* × 20. D2221, U.S.N.M. No. 10098.
2. *Reophax nodulosus.* × 20. D2383, U.S.N.M. No. 10119.
3. *Reophax nodulosus.* × 15. D2568, U.S.N.M. No. 10124*a*.
4. *Reophax dentaliniformis.* × 25. D2160, U.S.N.M. No. 10159*a*.
5. *Reophax dentaliniformis.* × 25. D2111, U.S.N.M. No. 10157*a*.
6. *Reophax bacillaris.* × 20. D2043, U.S.N.M. No. 10212*b*.
7. *Reophax hispidulus.* × 25. D2677, U.S.N.M. No. 10670.
8. *Reophax cylindricus.* × 15. D2222, U.S.N.M. No. 10130.



LITUOLIDAE OF THE ATLANTIC OCEAN.

FOR EXPLANATION OF PLATE SEE PAGE 94.

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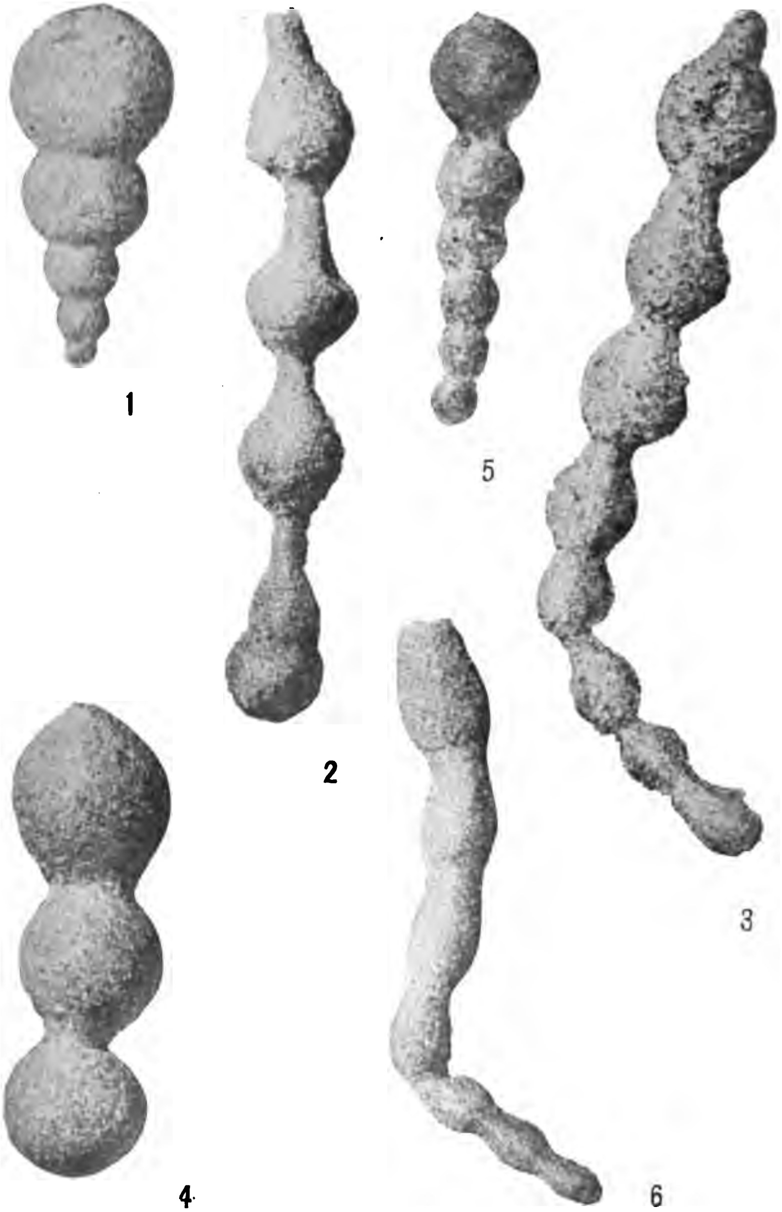


LITUOLIDAE OF THE ATLANTIC OCEAN.

FOR EXPLANATION OF PLATE SEE PAGE 95

PLATE 6.

Fig. 1 *Hormosina globulifera.* × 15. D2076, U.S.N.M. No. 10040*a*.
2 *Hormosina ovicula.* × 20. D2399, U.S.N.M. No. 10071*a*.
3. *Hormosina ovicula,* var. *mexicana.* × 10. D2150, U.S.N.M. No. 10080*a*
4. *Hormosina monile* × 20. D2385, U.S.N.M. No. 10075*a*.
5. *Hormosina ovaliformis.* × 20. D2385, U.S.N.M. No. 10065.
6. *Hormosina carpenteri.* × 10 D2038, U.S.N.M. No. 10078*a*.

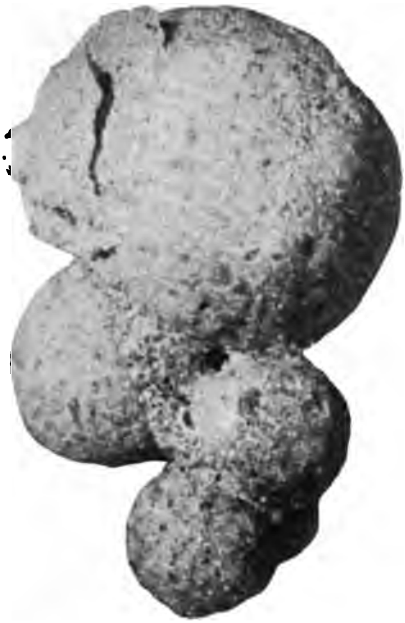
PLATE 7.

FIG. 1. *Hormosina normani.* × 15. D2766, U.S.N.M. No. 10090*a*.

2. *Haplostiche dubia.* × 15. Megalospheric form. D2404, U.S.N.M. No 10229*b*.

3. *Haplotische dubia.* × 15. Microspheric form. D2004, U.S.N.M, No. 10029*a*.

4. *Haplostiche dubia*, var. *intermedia.* × 10. Off Barbados, 100 fathoms. *Hassler.*



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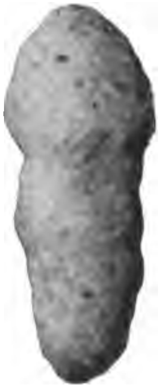

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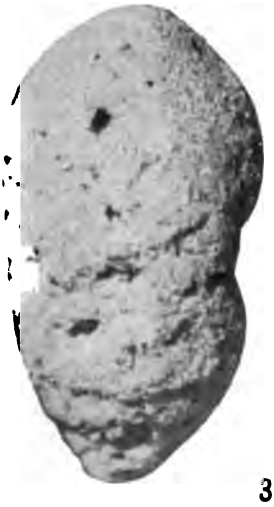

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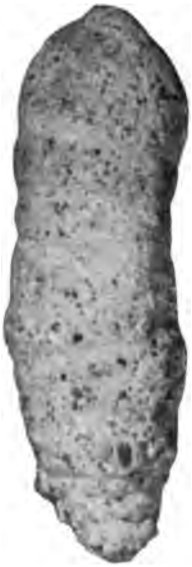

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LITUOLIDAE OF THE ATLANTIC OCEAN.

FOR EXPLANATION OF PLATE SEE PAGE 96.

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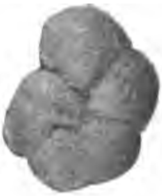

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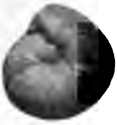

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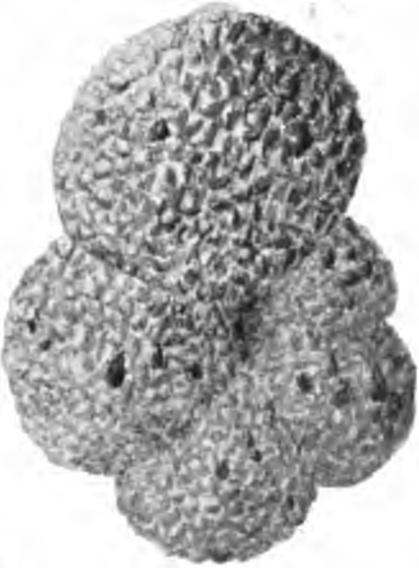

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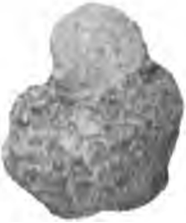

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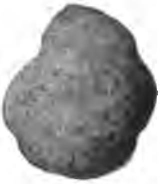

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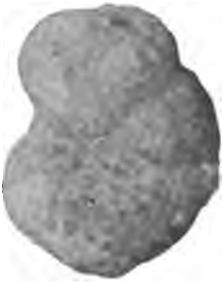

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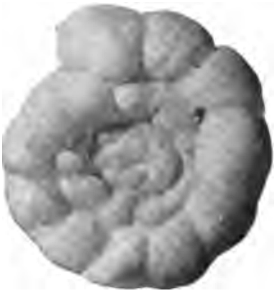

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LITUOLIDAE OF THE ATLANTIC OCEAN.

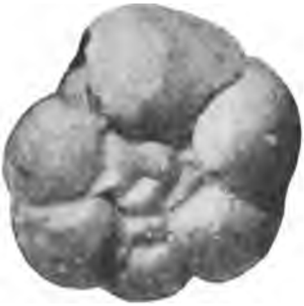
FOR EXPLANATION OF PLATE SEE PAGE 97.

PLATE 8.

FIG. 1. *Haplophragmoides canariensis.* × 20. D2003, U.S.N.M. No. 10294*a*.
2. *Haplophragmoides scitulum.* × 20. D2568, U.S.N.M. No. 10277*a*.
3. *Haplophragmoides sphaeriloculum.* × 50.
4. *Haplophragmoides emaciatum.* × 20. D2547, U.S.N.M No. 10350*a*.
5. *Haplophragmoides subglobusum.* × 25. D2568, U.S.N.M. No. 10317*a*.
6. *Haplophragmoides major.* × 15. D2453, U.S.N.M. No. 10676*a*.
7. *Trochamminoides proteus.* × 20. D2383, U.S.N.M. No. 10616*a*.

PLATE 9.

FIG. 1. *Haplophragmoides coronata.* × 20. D2751, U.S.N.M. No. 10282*a*.
2. *Haplophragmoides ringens.* × 20. D2383, U.S.N.M. No. 10246*a*.
3. *Haplophragmoides rotulatum.* × 50. (After Brady.)
4. *Haplophragmoides rotulatum.* × 50. (After Brady.)
5. *Haplophragmoides trullissata.* × 50. (After Brady.)
6. *Haplophragmoides glomeratum.* × 75. (After Brady.)



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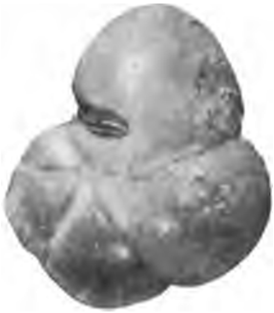

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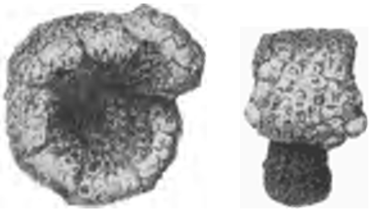

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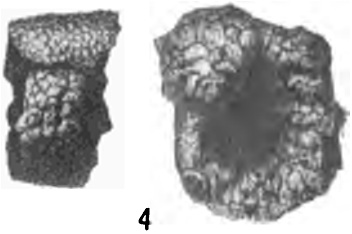

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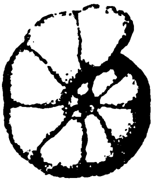

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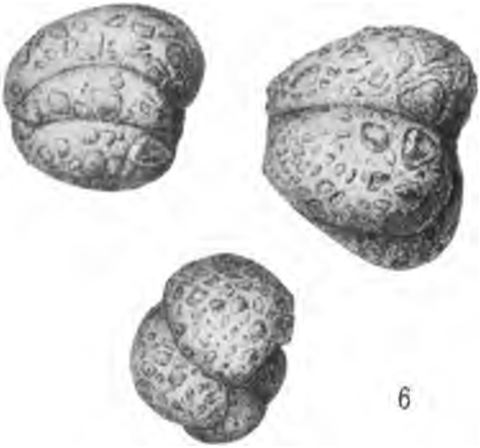

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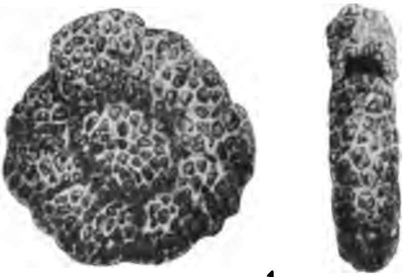
LITUOLIDAE OF THE ATLANTIC OCEAN.

FOR EXPLANATION OF PLATE SEE PAGE 98.

UNIV. OF MICH.



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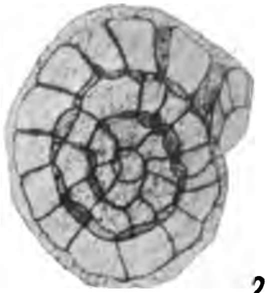

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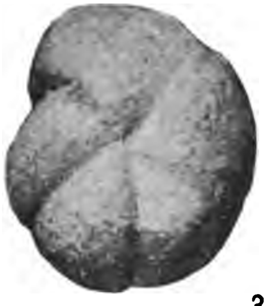

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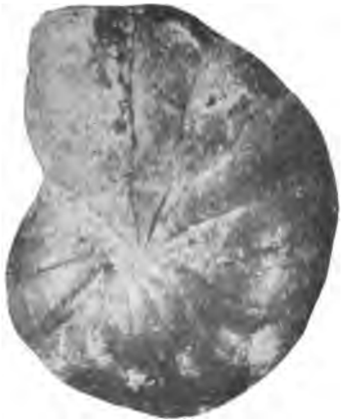

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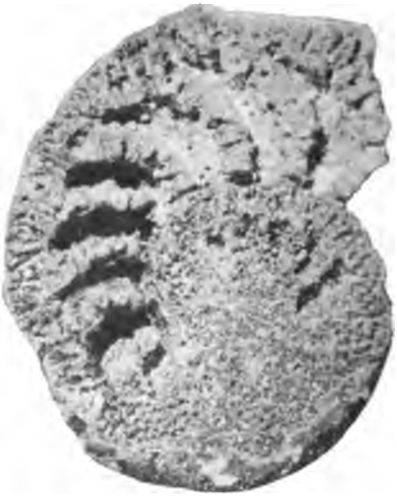

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LITUOLIDAE OF THE ATLANTIC OCEAN.

FOR EXPLANATION OF PLATE SEE PAGE 99.

PLATE 10.

FIGS. 1 and 2. *Haplophragmoides runianum*. (After Heron-Allen and Earland). Fig. 1, × 113; fig. 2, × 150.

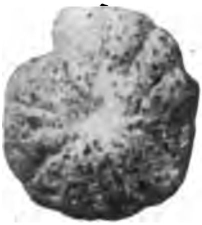
3. *Cribrostomoides bradyi*. × 20. D2043, U.S.N.M. No. 10366*a*.

4. *Cyclammina cancellata*. × 15. D2678, U.S.N.M. No. 10452*a*

5. *Cyclammina cancellata*. × 15. *Porcupine* (from W. B. Carpenter, U.S.N.M. No. 6250.)

PLATE 11.

FIG. 1. *Cyclammina compressa.* × 15. D2203, U.S.N.M. No. 10393*a*.
2. *Cyclammina pauciloculata.* × 15. D2399, U.S.N.M. No. 10422*a*.
3. *Cyclammina bradyi.* × 20. D2542, U.S.N.M. No. 10432.
4. *Cyclammina pusilla.* × 15. (After Brady.)
5. *Cyclammina pusilla.* × 15. (After Brady.) Section.
6. *Cyclammina pusilla.* × 30. (After Brady.) Section.
7. *Cyclammina orbicularis.* × 15. (After Brady.)
8. *Cyclammina orbicularis.* × 15. (After Brady.) Section.
9. *Cyclammina orbicularis.* (After Brady.) Section.



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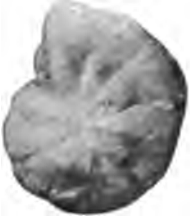

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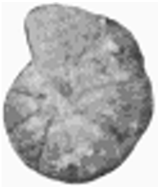

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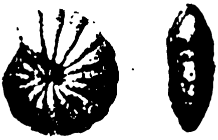

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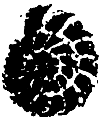

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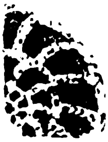

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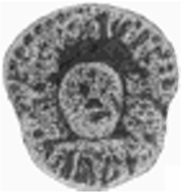

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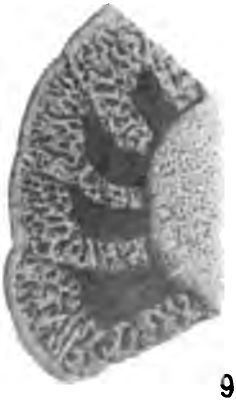

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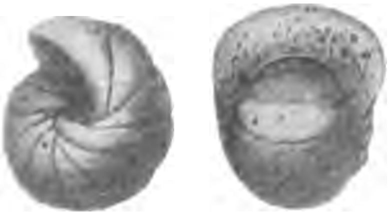

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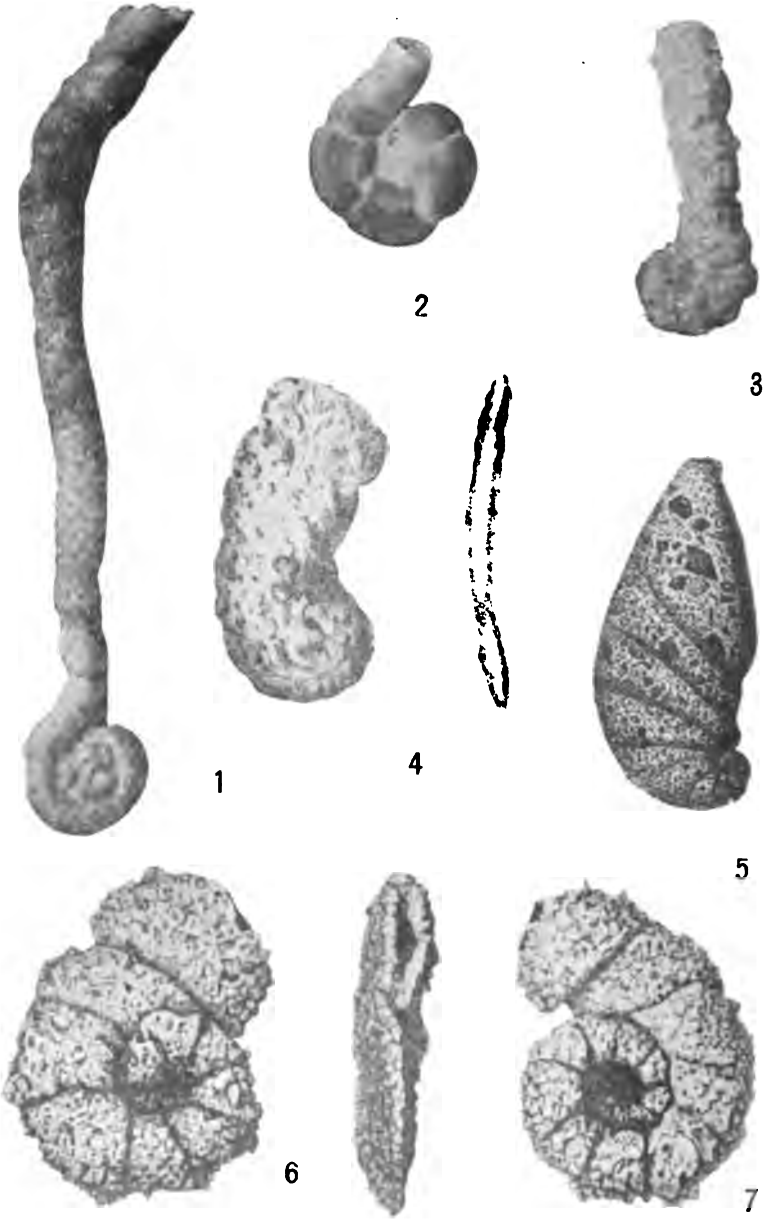
LITUOLIDAE OF THE ATLANTIC OCEAN.

FOR EXPLANATION OF PLATE SEE PAGE 100.

UNIV. OF MICH.



LITUOLIDAE OF THE ATLANTIC OCEAN.

FOR EXPLANATION OF PLATE SEE PAGE 101.

PLATE 12.

FIG. 1. *Lituotuba lituiformis*. × 20. H80, U.S.N.M. No. 10467.
2. *Lituotuba lituiformis*. × 15. H405, U.S.N.M. No. 10472*a*.
3. *Ammobaculites agglutinans*. × 20. D2043, U.S.N.M. No. 10499.
4. *Ammobaculites pseudospirale*. × 35. (After Williamson.)
5. *Ammobaculites cassis*. × 35. (After Brady.)
6 and 7. *Ammobaculites americanus*. × 20. (After Brady.)

PLATE 13.

FIG. 1. *Ammobaculites foliaceus.* × 25. D2039. U.S.N.M. No. 10485.

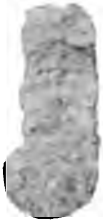
2. *Ammobaculites foliaceus.* × 25. D2039, U.S.N.M. No. 10485.

3. *Ammobaculites tenuimargo.* × 75. Microspheric form, by transmitted light.

4 and 5. *Ammobaculites tenuimargo.* × 20. D2018, U.S.N.M. No. 10473*a*.

6. *Ammobaculites reophaciformis.* × 25. Montego Bay, Jamaica.

7. *Haplophragmium lituolinoideum.* × 15. D2706, U.S.N.M. No. 10696*a*.



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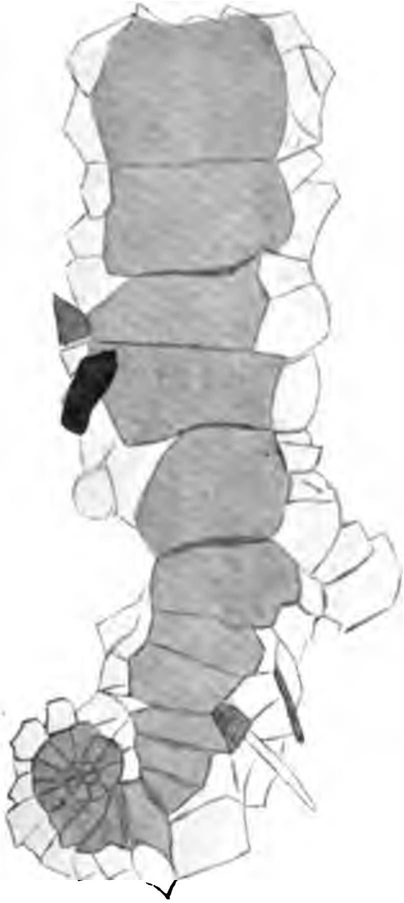

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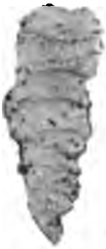

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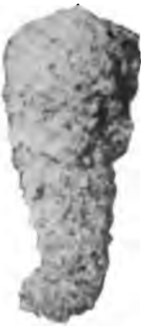

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LITUOLIDAE OF THE ATLANTIC OCEAN.

FOR EXPLANATION OF PLATE SEE PAGE 102.

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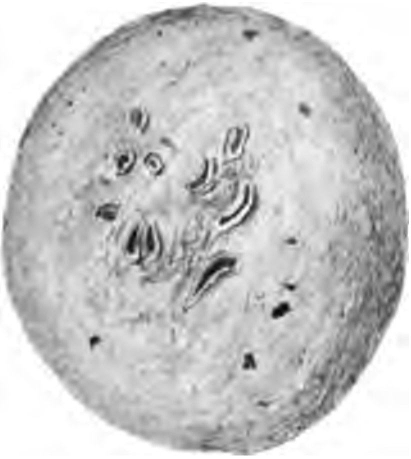

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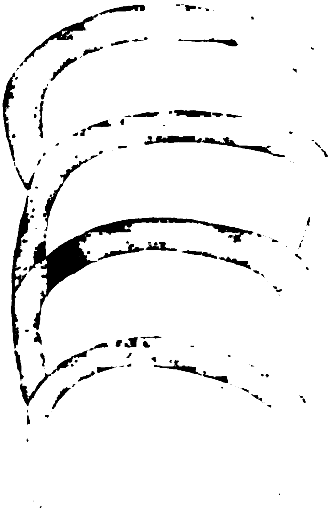

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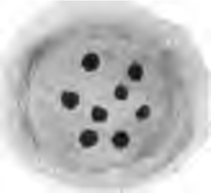

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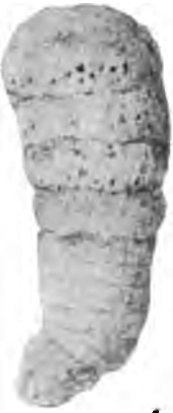

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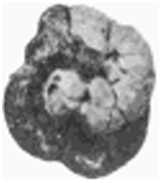

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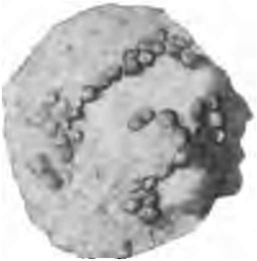

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LITUOLIDAE OF THE ATLANTIC OCEAN.

FOR EXPLANATION OF PLATE SEE PAGE 103.

PLATE 14.

FIG. 1. *Lituola mexicana.* × 40. End view.

2. *Lituola mexicana.* × 30. Last chambers in section.

3. *Lituola mexicana.* × 30. Pores of the interior wall of one of the earlie chambers.

4. *Lituola mexicana.* × 15. D2399, U.S.N.M. No. 10698a.

5. *Placopsilina cenomana.* × 20. D2371, U.S.N.M. No. 10551.

6. *Placopsilina confusa.* × 20. D2115, U.S.N.M. No. 10549.

PLATE 15.

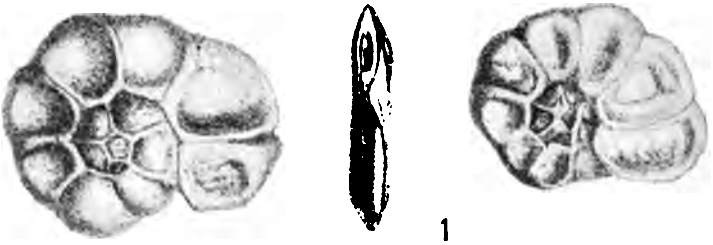
FIG. 1. *Trochammina inflata*, var. *macrescens*. × 90 (After Brady.)

2. *Trochammina nitida*. × 50. (After Brady) *a*, dorsal view, *b*, ventral view, *c*, apertural end.

3. *Trochammina ochracea*. × 125. (After Williamson.)

4. *Trochammina plicata*. (After Balkwill and Wright.)

5. *Trochammina bradyi*. × 100. (After Wright.)



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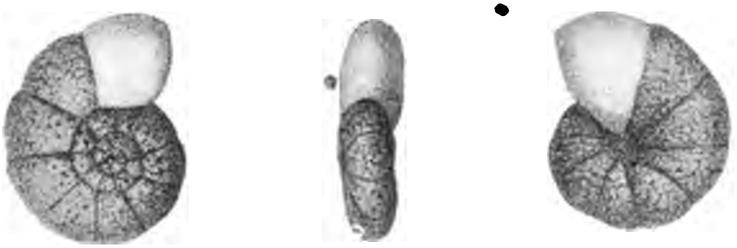

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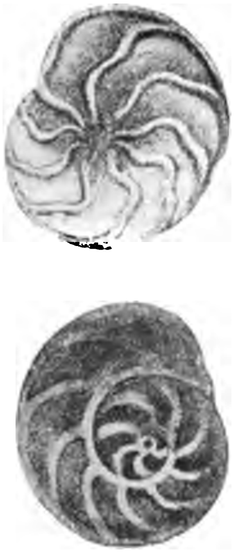

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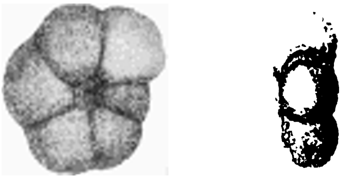

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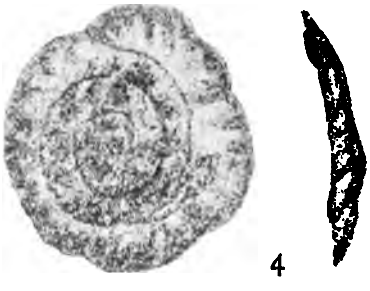

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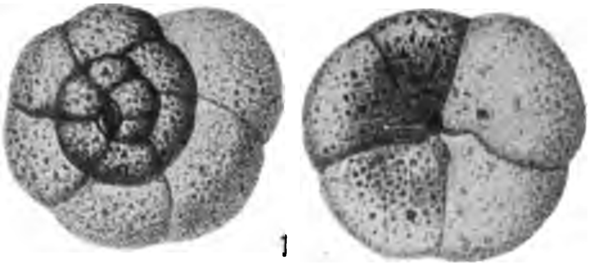
Lituolidae of the Atlantic Ocean.

For explanation of plate see page 104.



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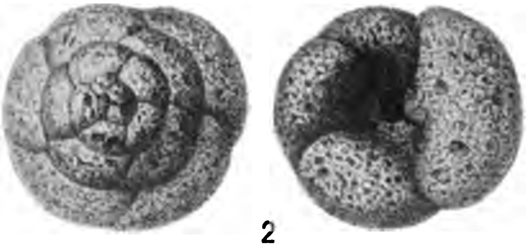

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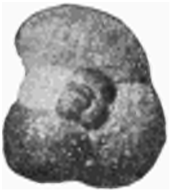

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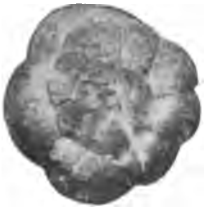

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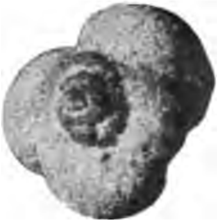

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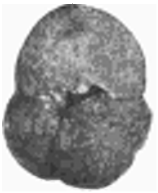

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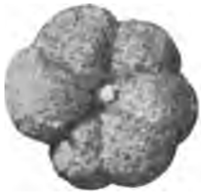

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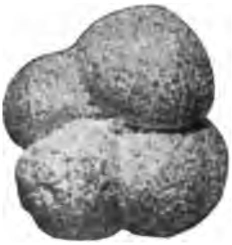

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LITUOLIDAE OF THE ATLANTIC OCEAN.

FOR EXPLANATION OF PLATE SEE PAGE 105.

PLATE 16.

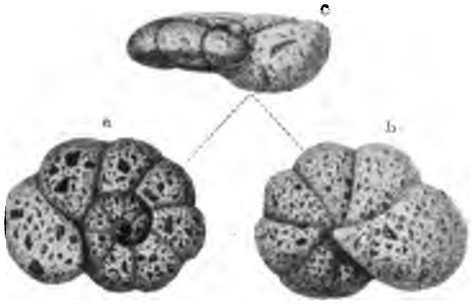
FIGS. 1 and 2. *Trochammina rotaliformis*. × 150. (After Balkwill and Wright.)

3. *Trochammina globulosa*. × 20. D2041, U.S.N.M. No. 10623*a*, dorsal view.
4. *Trochammina globulosa*. × 20. D2041, U.S.N.M. No. 10623*b*, ventral view.
5. *Trochammina globigeriniformis*. × 20. D2038, U.S.N.M. No. 10570*a*, dorsal view.
6. *Trochammina globigeriniformis*. × 20. D2682, U.S.N.M. No. 10607*a*, ventral view.
7. *Trochammina subturbinata*. × 20. D2383, U.S.N.M. No. 10648*a*, dorsal view.
8. *Trochammina subturbinata*. × 20. D2383, U.S.N.M. No. 10648*a*, ventral view.

PLATE 17.

FIG. 1. *Trochammina nana.* × 120. (After Brady) *a*, dorsal view, *b*, ventral view, *c*, apertural view.

2. *Trochammina turbinata.* × 20. D2289, U.S.N.M. No. 10560*a*.
3. *Trochammina conglobata.* × 20. D2355, U.S.N.M. No. 10653.
4. *Globotextularia anceps.* × 15. D2226, U.S.N.M. No. 10619*a*.
5. *Ammosphaeroidina sphaeroidiniformis.* × 20. D2110, U.S.N.M. No. 10541*a*.



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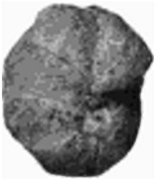

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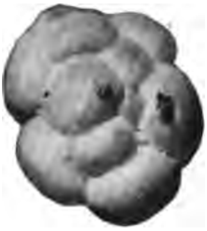

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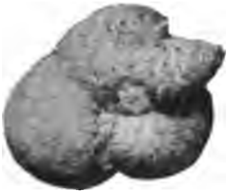

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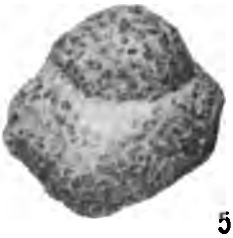

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LITUOLIDAE OF THE ATLANTIC OCEAN.

FOR EXPLANATION OF PLATE SEE PAGE 108.

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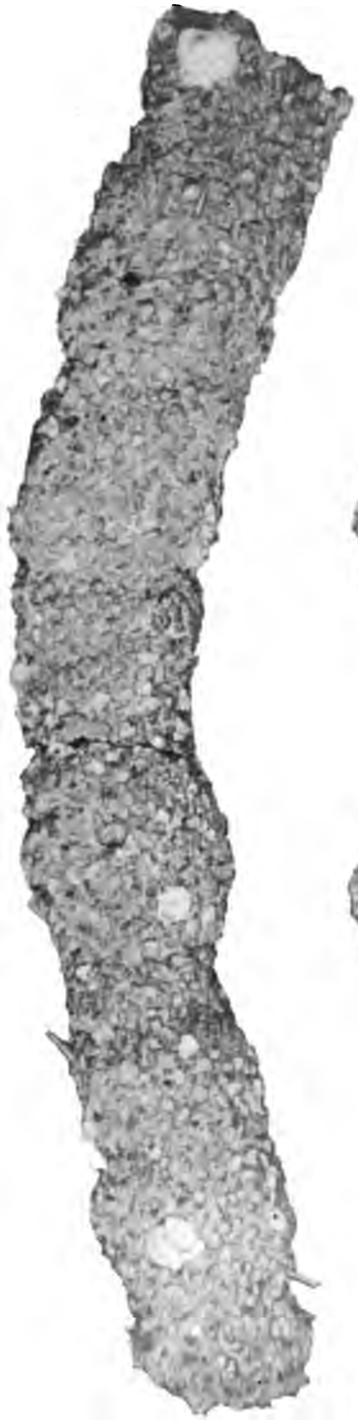
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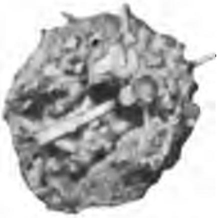
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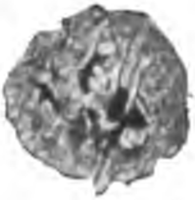
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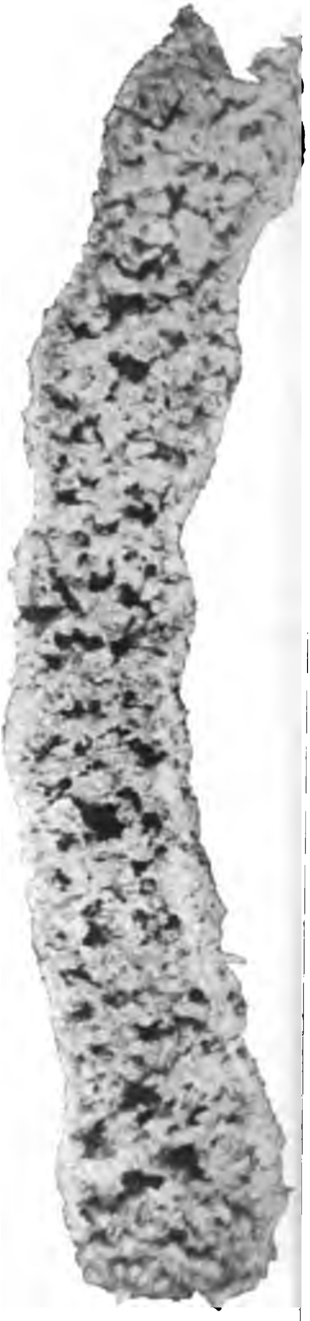

LITUOLIDAE OF THE ATLANTIC OCEAN.

FOR EXPLANATION OF PLATE SEE PAGE 107.

PLATE 18.

FIG. 1. *Botellina labyrinthica.* × 10. *Porcupine* 51. U.S.N.M. No. 6247, exterior.

2. *Botellina labyrinthica.* × 10. *Porcupine* 51. U.S.N.M. No. 6247, longitudinal section.

3 and 4. *Botellina labyrinthica.* × 10. Transverse sections (same station).

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THE FORAMINIFERA OF THE ATLANTIC OCEAN

PART 3. TEXTULARIIDAE

BY

JOSEPH AUGUSTINE CUSHMAN
Of the Boston Society of Natural History

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INTRODUCTION.

This paper is the third part of a work the intent of which is to describe and illustrate the Foraminifera of the Atlantic Ocean, especially those species which have occurred in the waters adjacent to the shores of the United States, including the whole of the Gulf of Mexico and the Carribean Sea, that being the area in which most of the work of the vessels of the United States engaged in dredging work has been done. This part includes only the family Textulariidae. The first part issued in 1918 included the family Astrorhizidae, and the second part issued in 1920 included the family Lituolidae.

JOSEPH AUGUSTINE CUSHMAN.

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THE FORAMINIFERA OF THE ATLANTIC OCEAN.

TEXTULARIIDAE.

By Joseph Augustine Cushman,
Of the Boston Society of Natural History.

INTRODUCTION.

This third part of the work on the Atlantic Foraminifera deals entirely with the Textulariidae, a family allied to the Astrorhizidae, which took up Part 1 of this work, and the Lituolidae, which took up Part 2, in that the test in numerous genera is made up of foreign material, sand grains, etc. The same arrangement of data is followed as in Parts 1 and 2. The classification is that adopted in Part 1 of my work on the North Pacific Foraminifera. The distribution of various species still further emphasizes the faunal areas developed in the western Atlantic and their relation to the Indo-Pacific. Many of these species recorded in this part are evidently limited in their distribution to the western Atlantic.

SYSTEMATIC PART.

A systematic presentation of the various groups of the family follows:

Family 4. TEXTULARIIDAE.

Test either arenaceous or calcareous, perforate, the chambers usually numerous, typically biserial or triserial, or in some genera spirally arranged.

The family Textulariidae is apparently more primitive than most of the other families of the Foraminifera and seems to naturally follow the Lituolidae in its general characters. A number of the simpler genera are wholly or in part composed of species with arenaceous tests, and this in itself is a primitive character. Many species are known in both microspheric and megalospheric forms, the former, as in other groups, repeating more of the phylogenetic characters than are seen in the megalospheric form. In many species of various genera the microspheric form shows a coiled early development, following the proloculum, and this may be taken as the primitive character for the whole group. This coiled stage may be compared to the entire development of such a genus as *Haplophragmoides* in the Lituolidae.

In the most primitive subfamily, the Spiroplectinae, the coiled development is continued for a fairly long period, and makes up a considerable portion of the test. This coiled stage also occurs in both the microspheric and megalospheric forms, showing that this subfamily is decidedly primitive and has not as yet become so specialized as to lose the coiled stage in the megalospheric form. In *Spiroplecta*, the only genus of this subfamily, the coiled development is followed by a series of more or less numerous chambers arranged biserially. *Spiroplecta* in its stages of development recapitulates the essential features of the Textulariidae—a proloculum, followed by a closely coiled series of chambers, in turn followed by a biserially arranged group. This sequence is the basis of the development throughout the family, as will be shown, and is not an exceptional character.

In the Textulariinae, the typical genus of which, *Textularia*, may be taken as an example, the same stages are shown, but are modified by specialization and acceleration of development. The earlier stages are either much reduced or are entirely skipped. Microspheric forms of certain species of *Textularia* have been referred by many later writers to *Spiroplecta*, but in the type species of *Textularia* both of these forms occur, and if such a procedure were adhered to the genus *Textularia* would have to be made synonymous with *Spiroplecta* and the former used as the older name, the latter being dropped. As used here, however, *Spiroplecta* includes simply those species which have a very considerable coiled stage, and in which it usually occurs in both forms, microspheric and megalospheric.

In *Textularia* it is only very rarely, so far as observed, that a coiled stage occurs in the megalospheric form, and then in but a very few chambers. It is obvious, therefore, that the microspheric form of many species of *Textularia* has a coiled development in the young.

In this same subfamily have been included those other genera which have essentially a biserial arrangement of the chambers, such as *Bolivina* and *Pavonina*, and a biserial development followed by a uniserial, as in *Bigenerina*. In this last genus there is a coiled development in the microspheric form of at least one species.

In the subfamily Verneuilininae the typical arrangement of the adult chambers is triserial instead of biserial, but here again there is in the microspheric form of some species a coiled series of chambers in the young. The specimens are much more difficult to manipulate, and the coiled series may be more common than many at first appear. The expected modification—the return to the biserial condition of the previous subfamily—takes place in *Gaudryina*, in some species only in the last-formed chambers, in other species appearing by acceleration of development early in the life history, the triserial portion much reduced. In *Clavulina* there is a complete return to the uniserial condition, but with the triserial character present in the young.

The subfamily Bulimininae, as here considered, includes the spiral forms with a loop-shaped aperture, such as *Bulimina* and *Virgulina*, the latter tending to assume a biserial arrangement. The test here is hyaline and perforate.

The subfamily Cassidulininae includes species which are like the Bulimininae in their aperture, but which have a peculiar arrangement of the chambers. These are biserial, but are secondarily coiled in a helicoid spiral. In *Cassidulina* the species are either completely involute, or in late growth are somewhat uncoiled. In *Ehrenbergina* the uncoiling takes place early and little of the involute character is seen.

The Textulariidae as a whole are much more rich in ornamentation and complex forms than are any of the preceding families. In *Bolivina* and in some species of *Bulimina*, *Ehrenbergina*, and *Virgulina*, there is a considerable range of ornamentation, punctae, limbate sutures, knobs or bosses, costae and spines being the most common forms. On the whole, however, the ornamentation is simple and uninteresting compared with that seen in the Lagenidae.

Subfamily 1. SPIROPLECTINAE.

Test either coarsely arenaceous or calcareous, or even hyaline, the early chambers following the proloculum closely coiled, the later chambers biserial, occasionally tending to become uniserial in the last developed chambers.

This subfamily includes the single genus *Spiroplecta*, which in its developmental stages connects the Textulariidae with the Lituolidae. Its development is primitive in that the stages are seen in both the microspheric and megalospheric forms of the species, and are of comparatively long duration.

Genus SPIROPLECTA Ehrenberg, 1844.

Spiroplecta EHRENBERG (type, *S. americana* Ehrenberg), Monatsber. preuss. Akad. Wiss. Berlin, 1844, p. 75.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 375.—CHAPMAN, The Foraminifera, 1902, p. 170.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 2, 1911, p. 4.

Description.—Test with the early chambers close-coiled in both the microspheric and megalospheric forms, later chambers biserial, wall typically arenaceous.

This genus is known from as far back as the lower Cretaceous. Some of the species have a very elongate biserial condition, and in others the two parts are nearly equal. In some species of *Textularia* also there is a coiled stage in the early development of the microspheric form, but it is not usually present in the megalospheric form of the same species.

Spiroplecta is here limited to the species which show both in the microspheric and megalospheric forms a definite coiled stage. The best developed species seem to be from the Indo-Pacific region, but *Spiroplecta biformis* seems to be very largely a species of cold waters.

SPIROPLECTA BIFORMIS (Parker and Jones).

Textularia agglutinans D'ORBIGNY, var. *biformis* PARKER and JONES, Philos. Trans., vol. 155, 1865, p. 370, pl. 15, figs. 23, 24.

Textularia biformis H. B. BRADY, Ann. Mag. Nat. Hist., ser. 5, vol. 1, 1878, p. 436, pl. 20, fig. 8.

Spiroplecta biformis H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 376, pl. 45, figs. 25–27.—BALKWILL and WRIGHT, Trans. Roy. Irish Acad., vol. 28, 1885, p. 333, pl. 13, fig. 21.—H. B. BRADY, Journ. Roy. Micr. Soc., 1887, p. 895.—SCHLUMBERGER, Mèm. Soc. Zool. France, 1894, p. 239.—GOËS, Köngl. Svensk. Vet. Akad. Handl., vol. 25, No. 9, 1894, p. 38, pl. 7, figs. 308–312.—WHITEAVES, Geol. Survey Canada, 1901, p. 10.—EARLAND, Journ. Quekett Micr. Club., ser. 2, vol. 9, 1905, p. 204.—AWERINZEW, Mem. Acad. Imp. Sci. St. Petersburg, ser. 8, vol. 29, No. 3, 1911, p. 17.—KIAER, in Duc d'Orleans Crois. Ocèan, Mèr du Grönland, 1905 (1907), p. 560.—HERON-ALLEN and EARLAND, Journ. Roy. Micr. Soc., 1908, p. 310; Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 56.—PEARCEY, Trans. Roy. Soc. Edinburgh, vol. 49, 1914, p. 1012.—HERON-ALLEN and EARLAND, Trans. Linn. Soc. London, vol. 11, ser. 2, 1916, p. 231.—SIDEBOTTOM, Journ. Roy. Micr. Soc., 1918, p. 22.

Description.—Test small, elongate, compressed, initial end broadly rounded, sides nearly parallel, rounded, apertural end bluntly pointed; early chambers close-coiled, later ones biserial, inflated; sutures distinct, depressed, wall arenaceous, with reddish-brown cement, rather smoothly finished on the exterior; aperture at the base of the inner margin of the last-formed chamber.

Length about 0.25 mm.

Distribution.—Parker and Jones described this species from off the Hunde Islands, Davis Strait, in 60 to 70 fathoms (110 to 128 meters). From the known records of this species it is characteristically an Arctic species of comparatively shallow water and very deep cold water elsewhere. Specimens are recorded from the coasts of Europe and the British Isles and in the Gulf of St. Lawrence. In the Arctic it is known from off Franz Josef Land, the west coast of Nova Zembla, Baffin Bay and Smith Sound, Spitzbergen, Barents Sea, Nordenskiold Sea, at depths ranging from 2 to 270 fathoms (4 to 496 meters), and in the Antarctic in 2,110 fathoms (3,859 meters), *Scotia* station 337A (Pearcey).

SPIROPLECTA FUSCA Earland.

Plate 4, fig. 4.

Spiroplecta fusca EARLAND, Journ. Quekett Micr. Club, ser. 2, vol. 9, 1905, p. 204, pl. 12, figs. 1–3.—HERON-ALLEN and EARLAND, Journ. Roy. Micr. Soc., 1909, p. 331; Trans. Linn. Soc. London, vol. 11, ser. 2, Zoology, 1912, p. 232.

This species described by Earland from the sands at Bognor has been recorded also from Selsey Bill and from the coast of Scotland. It is not known except about the British Isles.

SPIROPLECTA WRIGHTII Silvestri.

Plate 4, figs. 5–8.

Spiroplecta sagittula (Defrance) WRIGHT, Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 471; Irish Nat., vol. 11, 1902, p. 211, pl. 3.

Spiroplecta wrightii SILVESTRI, Atti Accad. Rom. Nuovi Lincei, Ann. 56, 1903, pp. 1–5 (woodcuts).—HERON-ALLEN and EARLAND, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 64.

The Spiroplectine forms often referred to *Textularia sagittula* have been named by Silvestri *Spiroplecta wrightii*. Such forms seem to be common off the coast of the British Isles but are not known from the western Atlantic.

Subfamily 2. TEXTULARIINAE.

Test typically biserial, wholly or in part, the early portion in the microspheric form often with a few coiled chambers, followed by the biserial chambers; later chambers variously modified in the different genera, uniserial, broadly extended, etc.; wall either arenaceous or calcareous and hyaline, perforate; aperture single, or in a few cases, many present in a single chamber.

This subfamily includes those forms which are essentially biserial in their development, not having reached the triserial stage anywhere in their stages of development. The stages in the simpler genera are like those of *Spiroplecta*, except in duration, the biserial condition being taken on much earlier than in that genus. Variously modified forms occur as in the uniserial arrangement in *Bigenerina*, the broadly flaring later growth of *Pavonina*, and the peculiarly modified aperture in *Pleurostomella*.

Genus TEXTULARIA Defrance, 1824.

Textularia DEFRANCE (type, *T. sagittula* Defrance), Dict. des Sci. Nat., vol. 32, 1824, p. 177; vol. 53, 1828, p. 344; Atlas Conch., pl. 13, fig. 5.—CHAPMAN, The Foraminifera, 1902, p. 165.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 2, 1911, p. 5.

Textilaria EHRENBERG, Abh. preuss. Akad. Wiss. Berlin, 1839, p. 135.

Grammostomum EHRENBERG (part), Abh. preuss. Akad. Wiss. Berlin, 1839, p. 129.

Plecanium REUSS, Sitz. Akad. Wiss. Wien, vol. 44, 1861 (1862), p. 383.

Description.—Test elongate, tapering, composed of two series of alternating chambers; wall calcareous in the young, hyaline and perforate, occasionally so throughout the test, often with an external coating of siliceous or calcareous sand, or in some species nearly the whole test arenaceous; aperture typically an arched slit at the inner margin of the chamber close to its line of attachment to the preceding chamber; occasionally with the aperture surrounded by a raised lip, or in some species with the aperture circular and terminal.

There are numerous modifications in the species of the genus due mainly to differences in the amount and the direction of compression. Except for spines and accessory growths of the sutures and periphery there is little ornamentation. The young of the microspheric form is often coiled but usually not that of the megalospheric form. Typically the genus consists of forms with an arenaceous test, either smoothly finished or rough, with a series of chambers alternating on opposite sides of a central axis. The aperture typically is in a reentrant of the inner margin of the apertural end but in some species may become terminal or even a series of pores.

From this genus are developed numerous forms such as *Bigenerina*, etc., which have evidently been derived from such forms as *Textularia*. Its geological history goes very far back, at least into the Paleozoic. Its range is given by Chapman as Cambrian to Recent. In the present oceans it reaches its best development in shallow water of tropical seas but is abundant in some parts of the temperate zone, and a few species live at considerable depths.

TEXTULARIA SAGITTULA Defrance?

Specimens from two stations, D2311, in 79 fathoms (145 meters), and D2314, in 159 fathoms (291 meters), off the southeastern coast of the United States, may possibly belong to this species although they are not typical. They are represented by single specimens and a note of their occurrence is all that can be done with them at the present time.

Much more typical specimens of this species occur off the coasts of Europe, as is noted by many authors.

Textularia sagittula—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
17034	U.S.N.M.	1	D2311...	32 55 00 N.; 77 54 00 W..	79	59.1	crs. s. bk. sp.	Rare.
17035	U.S.N.M.	1	D2314...	32 43 00 N.; 77 51 00 W..	159	47.4	crs. s. bk. sp.	Rare.

TEXTULARIA SAGITTULA Defrance, var. JUGOSA H. B. Brady.

Heron-Allen and Earland record a single specimen which they have referred to this variety from off the western coast of Scotland.[1]

TEXTULARIA MAYORI Cushman.

Textularia mayori CUSHMAN, Publ. 311, Carnegie Inst. Wash., 1922, p. 23, pl. 2, fig. 3.

Description.—Test compressed, increasing rapidly in breadth, initial end rounded, apertural end obliquely truncate; surface fairly smooth; chambers rather indistinct; sutures slightly depressed; periphery of each chamber with an elongate, conical, spinose projection, often broken at the tips, those of the early portion directed backward, the later ones extending straight outward; wall arenaceous, of angular sand-grains with much fine cement; aperture very low, elongate, at the inner border of the last-formed chamber, in a reentrant of the border, with a thin lip above; color gray.

Length up to 0.80 mm.

This species occurred at 5 stations in the Tortugas area, usually those of greater depths. I have failed to find it in other material from the West Indies or Caribbean, although it is a striking form and could hardly be overlooked. With its peripheral spines it resembles such species as *T. carinata* d'Orbigny, *T. horrida* Egger, and *T. sagittula* Defrance, var. *fistulosa* H. B. Brady, but is different from any of these.

It is named in honor of Dr. Alfred G. Mayor, Director of the Tortugas Laboratory of the Carnegie Institution of Washington.

TEXTULARIA AGGLUTINANS d'Orbigny.

Plate 1, figs. 4, 5.

Textularia agglutinans D'ORBIGNY, in De la Sagra, Hist. Fis. Pol. Nat. Cuba, 1839, "Foraminifères," p. 136, pl. 1, figs. 17, 18, 32, 34.—GÖES, Bull. Mus. Comp. Zoöl., vol. 29, 1896, p. 41.—FLINT (part), Rep. U. S. Nat. Mus., 1897 (1899), p. 284, pl. 29, fig. 4.—CUSHMAN, Proc. U. S. Nat. Mus., vol. 59, 1921, p. 49, pl. 11, figs. 1–3; Bull. 100, U. S. Nat. Mus., vol. 4, 1921, p. 106, pl. 20, fig. 8; Publ. 311, Carnegie Inst. Wash., 1922, p. 22, pl. 1, fig. 6.

Description.—Test elongate, tapering, compressed, the periphery rounded; chambers inflated, increasing in height toward the apertural end; sutures distinct, depressed, wall rather coarsely arenaceous, but smoothly finished; aperture an elongate slit in a well-marked depression of the inner border of the chamber; color gray.

Length 1 mm. or slightly more.

Distribution.—D'Orbigny described this species from the shore-sands of Cuba. In the West Indian region typical specimens of this species occur in the region southward from Cape Hatteras, the Gulf of Mexico, and the Caribbean in comparatively shallow water. These fit well the description given by d'Orbigny. I have had it also from the coast of Jamaica. It has been customary for authors to place under this name most any form of elongate tapering *Textularia*, but from an examination of material from the West Indian region, it seems here to have a definite distribution and well defined characters. Its southward distribution reaches at least to southeastern Brazil, near Pernambuco, where it is recorded by Brady and Flint, and from which region I have *Albatross* material.

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[1] Trans. Linn. Soc., London, ser. 2, vol. 11, 1916, p. 229.

Textularia agglutinans—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
16970	U.S.N.M.	1	D2150...	13 34 45 N.; 81 21 10 W..	382	45.8	wh. crs. s....	Rare.
16971	U.S.N.M.	1	D2312...	32 54 00 N.; 77 53 30 W..	88	57.8	crs. s. bk. sp.	Rare.
16972	U.S.N.M.	2	D2313...	32 53 00 N.; 77 53 00 W..	99	57.2	crs. s. bk. sp.	Rare.
16973	U.S.N.M.	2	D2358...	20 19 00 N.; 87 03 30 W..	222	....	fne. wh. co..	Rare.
16974	U.S.N.M.	3	D2388...	29 24 30 N.; 88 01 00 W..	35	....	yl. s. bk. sp.	Rare.
16975	U.S.N.M.	3	D2614...	34 09 00 N.; 76 02 00 W..	168	....	gy. s. bk. sp.	Few.
16977	U.S.N.M.	6	D2639...	25 04 50 N.; 80 15 10 W..	56	....	co. s.........	Common.
16978	U.S.N.M.	8	D2641...	25 11 30 N.; 80 10 00 W..	60	69.2	co. s.........	Rare.
16979	U.S.N.M.	6	D2758...	6 59 00 S.; 34 47 00 W..	20	79.0	brk. sh......	Few.
16980	U.S.N.M.	1	....	Fowey, Fla................	55	....	....	Rare.
16981	U.S.N.M.	1	....	Key West, Fla...........	78	....	....	Rare.
16982	U.S.N.M.	5	....	Off Bell, Fowey, Fla.....	22	....	....	Few.

TEXTULARIA CANDEIANA d'Orbigny.

Plate 1, figs. 1–3.

Texularia candeiana D'ORBIGNY, in De la Sagra, Hist. Fis. Pol. Nat. Cuba, 1839, "Foraminifères," p. 143, pl. 1, figs. 25–27.—FORNASINI, Mem. Accad. Sci., Bologna, ser. 5, vol. 10, 1903, p. 137, pl. 0, fig. 8.—CHAPMAN, Rep. For. Subantarctic Ids., New Zealand, 1909, p. 329.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 2, 1911, p. 12, figs. 14–17 (in text); Publ. 291, Carnegie Inst. Washington, 1919, p. 32; Proc. U. S. Nat. Mus., vol. 59, 1921, p. 50, pl. 11, figs. 7, 8; Bull. 100, U. S. Nat. Mus., vol. 4, 1921, p. 109; Publ. 311, Carnegie Inst. Wash., 1922, p. 23, pl. 2, fig. 2.

Texularia sagittula DEFRANCE, var. *candeiana* MILLETT, Journ. Roy. Micr. Soc., 1899, p. 562, pl. 7, fig. 2.

Description.—Test elongate, club-shaped, the early portion narrow, much compressed, the edges almost carinate, slightly tapering to the round-pointed apex, the later chambers enlarging rapidly, much inflated; chambers numerous; wall rather coarsely arenaceous; aperture in a broad but shallow sinus at the base of the inner margin of the chamber; color dark gray.

Length about 1 mm.; microspheric proloculum about 0.015 mm., megalospheric proloculum about 0.050 mm.

Distribution.—D'Orbigny's original material of this species was from Cuba, Martinique, and St. Thomas. I have had specimens from Montego Bay, Jamaica, in 10 fathoms (18 meters). Specimens in the *Albatross* dredgings are from off the coast of Georgia, and off Cuba. It seems to occur in tropical regions elsewhere. Heron-Allen and Earland record it from off the British Isles, but the figures given are different from the typical form as developed in the West Indies.

Textularia candeiana—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
16966	U.S.N.M.	5	D2311	32 55 00 N.; 77 54 00 W..	79	59.1	crs.s.bk.sp..	Few.
16967	U.S.N.M.	5	D2312	32 54 00 N.; 77 53 30 W..	88	57.8	crs.s.bk.sp..	Few.
16968	U.S.N.M.	1	D2318	24 25 45 N.; 81 46 00 W..	45	75.0	co...........	Rare.
16969	U.S.N.M.	1	D2420	37 03 20 N.; 74 31 40 W..	104	47.7	bk.s.m.g....	Rare.

TEXTULARIA GOËSII Cushman.

Plate 1, fig. 6.

Textularia sagittula Defrance, var. Goës, Köngl. Svensk. Vet. Akad. Handl., vol. 19, No. 4, 1882, pl. 5, figs. 150–158.

Textularia trochus H. B. Brady (part), Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 366, pl. 43, fig. 17 (not 15, 16, 18, 19); pl. 44, figs. 1–3 [not *T. trochus* d'Orbigny].

Textularia goësii Cushman, Bull. 71, U. S. Nat. Mus., pt. 2, 1911, p. 15, fig. 24 (in text); Bull. 100, U. S. Nat. Mus., vol. 4, 1921, p. 113, pl. 21, fig. 3.

Distribution.—There are a few specimens from the Gulf of Mexico and from the Caribbean which may belong to this species. The specimens figured by Flint under the name of *T. gramen*[1], from *Albatross* station D2150 may be this same species. I have other specimens from this same station, which resemble very much Flint's figured ones.

Textularia goësii—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
17043	U.S.N.M.	2	D2150	13 34 45 N.; 81 21 10 W..	382	45.8	wh.crs.s....	Rare.

TEXTULARIA FUSIFORMIS Defrance.

Heron-Allen and Earland record a single specimen of this species from off the west coast of Scotland.[2]

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[1] Rep. U. S. Nat. Mus., 1897 (1899), pl. 29, fig. 5.

[2] Trans. Linn. Soc., London, ser. 2, vol. 11, 1916, p. 229.

TEXTULARIA GLOBULOSA Ehrenberg.

This species is recorded as recent off the Irish coast by Balkwill and Wright [4], by Brady [5], and by Wright.[6] Heron-Allen and Earland do not record it as recent in their various papers from the British coast.

TEXTULARIA GRAMEN d'Orbigny.

An examination of the figured specimens referred to this species by numerous authors and a comparison of these with the original figures of *T. gramen* given by d'Orbigny in his Vienna Basin Mèmoire shows how many different forms are placed under this name and how different most of them are from d'Orbigny's original type.

There is almost nothing in the western Atlantic material that can well be referred to this species. On the coasts of Europe specimens occur which show a broad, short form which, from an examination of the records, seems at least by some authors to have been referred to this species. I have had specimens from European material which may belong to this species, and which are different from any of the specimens of the western Atlantic.

TEXTULARIA LUCULENTA H. B. Brady.

Plate 1, figs. 7–9.

Textularia luculenta H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 364, pl. 43, figs. 5–8.—Goës, Bull. Mus. Comp. Zoöl., vol. 29, 1896, p. 42.—Flint, Rep. U. S. Nat. Mus., 1897 (1899), p. 284, pl. 29, fig. 3.

Description.—Test elongate, tapering, compressed, peripheral margin in the early portion angular, the later portion rounded, biserial, but toward the end the chambers tending to become uniserial, sides in the last half nearly parallel; chambers distinct, somewhat inflated, increasing in height toward the apertural end; sutures fairly distinct, very slightly compressed, wall finely arenaceous, rather smoothly finished, thick; aperture in the early portion as in *Textularia*, and in the last-formed chambers becoming nearly terminal, rounded; color light gray.

Length up to 2.5 mm.

Distribution.—Brady's original localities for this species are as follows: Off Sombrero Island, 450 fathoms (823 meters); off Culebra Island, 390 fathoms (713 meters); off Bermuda, 435 fathoms (796 meters), and off the coast of Brazil, south of Pernambuco, 350 and 675 fathoms (640 and 1,234 meters). Goës had the species from *Albatross* station D2150 in the western Caribbean. Flint records it from this same station, and from two others, D2315 in 37 fathoms (68 meters), off the coast of Cuba, and D2355, off Yucatan. I have had specimens from D2150 only. The *Albatross* specimens are very similar to those figured by Brady, and some of those from D2150 are even more so than the figures given by Flint. This is a well characterized species and evidently of fairly wide distribution in the Caribbean and related areas. The fact that it has not been recorded elsewhere seems to show that its distribution is limited to this area. It is to be regretted that Brady did not describe as new more species of this character found in the West Indian region, instead of referring them to older names to which they evidently did not belong. It would have simplified the later work.

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[4] Proc. Roy. Irish Acad., ser. 2, vol. 3, 1882; Trans. Roy. Irish Acad., vol. 28, 1885, pp. 332, 447.

[5] Journ. Roy. Micr. Soc., 1887, p. 895.

[6] Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 471.

There are specimens from four stations off the southeast coast of the United States, which although they do not show the adult characters, are apparently young specimens belonging to this species.

Textularia luculenta—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
16946	U.S.N.M.	10	D2150...	13 34 45 N.; 81 21 10 W..	382	45.3	wh. crs. s....	Common.
16965	U.S.N.M.	3	D2355...	20 56 48 N.; 86 27 00 W..	399	....	yl. oz........	Few.
17025	U.S.N.M.	1	D2614...	34 09 00 N.; 76 02 00 W..	168	....	gy. s. bk. sp..	Rare.
17026	U.S.N.M.	1	D2644...	25 40 00 N.; 80 00 00 W..	193	43.4	gy. s........	Rare.
17027	U.S.N.M.	3	D2659...	28 32 00 N.; 78 42 00 W..	509	45.2	br. for.......	Rare.
17028	U.S.N.M.	9	D2668...	30 58 30 N.; 79 38 30 W..	294	46.3	gy. s., dd. co.	Common.
17029	U.S.N.M.	2	D2677...	32 39 00 N.; 76 50 30 W..	478	39.3	gn. m.......	Rare.

TEXTULARIA PARVULA, new species.

Plate 6, figs. 1, 2.

Description.—Test small, very much elongate, five or six times as long as wide, gradually tapering from the bluntly pointed apical end to the broadly rounded apertural end; chambers numerous, distinct, inflated, increasing but slightly in height as added, subglobular; sutures distinct, much compressed, wall finely arenaceous, smoothly finished; aperture slightly rounded, at the central part of the inner margin of the last-formed chamber; color grayish with a slight tinge of yellowish-brown.

Length up to 0.45 mm.

Distribution.—Type-specimen (U.S.N.M.No. 17041) from *Albatross* station H79 in 821 fathoms (1,485 meters), in the eastern part of the Caribbean Sea. There is also a specimen from *Albatross* station D2398 in 227 fathoms (416 meters) and D2150 in 382 fathoms (697 meters). This is a very distinct but minute species. Its elongate, tapering form and the large number of very distinct subglobular chambers will distinguish it.

Textularia parvula—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
17070	U.S.N.M.	5	D2150...	13 34 45 N.; 81 21 10 W..	382	45.8	wh. crs. s....	Few.
17042	U.S.N.M.	1	D2398...	28 45 00 N.; 86 26 00 W..	227	48.6	gy. m.......	Rare.
17041	U.S.N.M.	1	H79.....	14 20 30 N.; 63 10 00 W..	821	....	co. s., sh. for.	Rare.

TEXTULARIA CATENATA Cushman.

Plate 6, fig. 3.

Textularia catenata CUSHMAN, Bull 71, U. S. Nat. Mus., pt. 2, 1911, p. 23, figs. 39, 40 (in text); Bull. 100, U. S. Nat. Mus., vol. 4, 1921, p. 112, pl. 23, fig. 5.

Description.—Test elongate, rounded in end view, composed of inflated chambers separated by rather deep sutures, making the outline of the test sinuous; wall somewhat coarsely arenaceous; aperture in the early chambers slit-like at the ventral border of the inner margin, in later chambers gradually moving away from the margin and in the last-formed chamber subterminal and rounded.

Length about 1 mm.; microspheric proloculum 0.022 mm.

Distribution.—There are single specimens from three stations southeast of New York which are very close, if not identical, with this species which I have described from the western Pacific in fairly deep water. They are perhaps less rounded than the Pacific form, but have the characteristic aperture which stands out, with a tubular neck some distance above the base of the chamber. There is another specimen which questionably may be this, from off Fowey Rocks, Florida, in 70 fathoms (128 meters).

Textularia catenata—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
17030	U.S.N.M.	1	D2105...	37 50 00 N.; 73 03 50 W..	1,395	41.0	glob. oz.....	Rare.
17031	U.S.N.M.	1	D2174...	38 15 00 N.; 72 03 00 W..	1,594	....	gy. m.......	Rare.
17032	U.S.N.M.	2	D2713...	38 20 00 N.; 70 08 30 W..	1,859	....	br. oz.......	Rare.
17033	U.S.N.M.	1	....	Off Fowey Rocks, Fla., S. by E. ½ E.	70	....	....	Rare.

TEXTULARIA ABBREVIATA d'Orbigny(?)

Plate 2, fig. 1.

Brady, Parker, and Jones record this species from off the Abrohlos Bank at three stations.[7] I have had no typical material which can be referred to this species; only a single specimen of a short broad form from *Albatross* station D2572 in 1,769 fathoms (3,235 meters), southeast of New England, can be referred here.

Textularia abbreviata—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
17044	U.S.N.M.	1	D2572...	40 29 00 N.; 66 04 00 W...	1769	37.8	gy. oz.......	Rare.

TEXTULARIA ASPERA H. B. Brady.

Wright records this species as rare off the southeast coast of Ireland in 1,000 fathoms (1,829 meters).[8] Pearcey records it from the warm area of the Faroe Channel[9] and from the Antarctic in deep waters.[10] This is recorded in the *Challenger* material from stations 23 and 24, in 450 and 390 fathoms (823 and 713 meters), off the Danish West Indies, and at station 120, in 675 fathoms (1,234 meters), off the eastern coast of Brazil.

TEXTULARIA FLINTII Cushman, var. CAROLINIANA, new variety.

Plate 2, fig. 4.

Description.—Variety differing from the typical in the much more elongate form, rounded periphery, in the lesser amount of concavity on the basal sides of the chambers, narrower throughout.

Distribution.—Type-specimen (U.S.N.M. No. 17038) from *Albatross* station D2614, in 168 fathoms (307 meters), off the coast of Carolina. A specimen which perhaps may belong to this variety is from 70 fathoms (128 meters) off Fowey Rocks, Florida.

Textularia flintii, var. caroliniana—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″				
17038	U.S.N.M.	1	D2614...	34 09 00 N.; 76 02 00 W...	168	....	gy. s. bk. sp..	Rare.
17039	U.S.N.M.	1	....	Off Fowey, Fla., S. by E. ½ E.	70	....	....	Rare.

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[7] Trans. Zool. Soc. London, vol. 12, 1888, p. 219, pl. 42, figs. 4, 5.

[8] Ann. Mag. Nat. Hist., ser. 6, vol. 4, 1889, p. 448.

[9] Trans. Nat. Hist. Soc. Glasgow, vol. 2, 1890, p. 176.

[10] Trans. Roy. Soc. Edinburgh, vol. 49, 1914, p. 1012.

TEXTULARIA FLINTII Cushman, var. CURTA, new variety.

Plate 2, figs. 2, 3.

Textularia agglutinans FLINT (part), Rep. U. S. Nat. Mus., 1897 (1899), p. 284, pl. 29, fig. 4 (part) [not *T. agglutinans* d'Orbigny].

Textularia rugosa BAGG, Proc. U. S. Nat. Mus., vol. 34, 1908, p. 131 [not *T. rugosa* (Reuss)].

Textularia flintii CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 2, 1911, p. 21, figs. 36*a*, *b* (in text).

Distribution.—Type-specimen (U.S.N.M. No. 17003) from *Albatross* station D2144, in 896 fathoms (1,639 meters), in the Caribbean. This species was originally referred by Flint to *T. agglutinans*, but, as has been previously pointed out, the two are very different. The Atlantic material shows this species only in the Caribbean, one station westward of the Windward Islands, the other three along the coast of Yucatan to Panama. There is very little variation in the specimens of this variety, but it differs from the Pacific specimens in having a more acute periphery and a broader shorter form.

Textularia flintii, var. curta—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
17002	U.S.N.M.	1	D2117...	15 24 20 N.; 63 31 30 W..	683	39.8	yl. m. fne. s..	Rare.
17003	U.S.N.M.	5	D2144...	9 49 00 N.; 79 31 30 W..	896	....	gn. m.......	Few.
17004	U.S.N.M.	8	D2150...	13 34 45 N.; 81 21 10 W..	382	45.8	wh. crs. s....	Common.
17005	U.S.N.M.	2	D2358...	20 19 00 N.; 87 03 30 W..	222	....	fne. wh. co...	Rare.
17006	U.S.N.M.	1	D2392...	28 47 30 N.; 87 27 00 W..	724	40.7	br. gy. m....	Rare.

TEXTULARIA ALBATROSSI, new species.

Plate 2, figs. 5, 6.

Textularia concava FLINT (part) (not Karrer), Rep. U. S. Nat. Mus., 1897 (1899), p. 283.

Description.—Test elongate, much tapering, apical end bluntly pointed, apertural end broadly angled, in the later portion the breadth nearly equal to the thickness, concave at each side in the middle, periphery convex; chambers distinct, the last ones much inflated, low and broad, each with a reentrant portion near the central part at each side; sutures distinct, depressed, wall coarsely arenaceous, rather smoothly finished, especially in the later portion; aperture a long, narrow slit above the base of the chamber, with a slight lip; color gray.

Length up to 1.75 mm.

Distribution.—Type-specimen (U.S.N.M. No. 17040) from *Albatross* station D2150, in 382 fathoms (697 meters), in the western part of the Caribbean Sea. Other specimens of this species occurred at this station, but it is not found elsewhere in the western Atlantic. An examination of Flint's mounted slides shows that this is the form noted by him under *T. concava* from this station, as given in the above reference. In some of its characters it is related to *T. concava*, and in its reentrant at each side of the test reminds one of T. *rugosa* Reuss, but in most of its characters it is very different from any of these. The sides are very concave in the middle, but in end view the breadth is nearly equal to the width. The last two or three chambers are much inflated and do not show the concavity at the sides. From the material examined from the western Atlantic this species seems to be very limited in its distribution, being found nowhere but at this one station.

Textularia albatrossi—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
17040	U.S.N.M.	3	D2150...	° ′ ″ ° ′ ″ 13 34 45 N.; 81 21 10 W..	382	°F. 45.8	wh. crs. s....	Few.

TEXTULARIA CONCAVA Karrer.

This species is recorded by Wright and others off the southwest of Ireland and by Heron-Allen and Earland from four stations in the Clare Island region. I have seen no Atlantic material which I should refer to the typical form of this species.

TEXTULARIA CONCAVA Karrer, var. HETEROSTOMA Fornasini.

Plate 2, figs. 7, 8.

Heron-Allen and Earland record two specimens of this variety from a station west of Scotland.[11]

TEXTULARIA SUBPLANA, new species.

Plate 2, fig. 10.

Textularia concava Flint (not Karrer) (part), Ann. Rep. U. S. Nat. Mus., 1897 (1899), p. 283, pl. 28, fig. 5 (part).

Description.—Test about twice as long as wide, tapering from the bluntly rounded initial end, very much compressed, sides flat, periphery flattened at right angles to the sides; chambers increasing slightly in height as added, rectangular; sutures distinct but not depressed, wall arenaceous with a large proportion of cement, very smoothly finished; color gray.

Length up to 1 mm. or slightly more.

Distribution.—Type-specimen (U.S.N.M. No 17045) from *Albatross* station D2641, in 60 fathoms (110 meters), off Carysfort Light, Florida. It has occurred at two other stations—D2639, in 56 fathoms (102 meters), also off the coast of Florida, and D2761, in 818 fathoms (1,483 meters), off the southeast coast of Brazil. Most of the specimens in Flint's figure belong to this species. One of his records for *T. concava* is from the type station.

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[11] Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 229. pl. 40, figs. 22, 23.

Textularia subplana—Material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
17036	U.S.N.M.	2	D2639...	25 04 50 N.; 80 15 10 W..	56	....	co. s.........	Rare.
17045	U.S.N.M.	2	D2641...	25 11 30 N.; 80 10 00 W..	60	69.2	co. s.........	Rare.
17037	U.S.N.M.	1	D2761...	15 39 00 S.; 38 32 54 W..	818	39.0	pter. oz.....	Rare.

TEXTULARIA FOLIACEA Heron-Allen and Earland, var. OCCIDENTALIS, new variety.

Plate 2, fig. 13.

Textularia concava FLINT (part) (not Karrer), Rep. U. S. Nat. Mus., 1897 (1899), p. 283.

Description.—Variety differing from the typical form of the species in being broader, less tapering, the apical end less acute.

Distribution.—Type-specimen (U.S.N.M. No. 16991) from *Albatross* station D2318, off the coast of Cuba, in 45 fathoms (82 meters). It has occurred often abundantly at stations in this general region, off the coast of Florida, and the northern part of the Gulf of Mexico, and northeastward along the coast of the United States as far as Chesapeake Bay. It has not been found at all in the collection from the Caribbean.

This is very close to the species described by Heron-Allen and Earland from the Kerimba Archipelago, off the southeastern coast of Africa. The typical form of the species also occurs in the Philippines. This broader form of the species is the same as that recorded by Flint under the name *T. concava,* from off Carysfort Light, *Albatross* station D2641, as his original slide shows.

Textularia foliacea, var. occidentalis—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
16988	U.S.N.M.	7	D2311...	32 55 00 N.; 77 54 00 W..	79	59.1	crs. s. bk. sp.	Common.
16989	U.S.N.M.	8	D2312...	32 54 00 N.; 77 53 30 W..	88	57.8	crs. s. bk. sp.	Common.
16990	U.S.N.M.	1	D2313...	32 53 00 N.; 77 53 00 W..	99	57.2	crs. s. bk. sp.	Rare.
16991	U.S.N.M.	1	D2318...	24 25 45 N.; 81 46 00 W..	45	75.0	co...........	Rare.
16992	U.S.N.M.	2	D2377 ..	29 07 30 N.; 88 08 00 W..	210	67.0	gy. m.......	Rare.
16993	U.S.N.M.	1	D2378...	29 14 30 N.; 88 09 30 W..	68	....	gy. m.......	Rare.
16994	U.S.N.M.	1	D2420...	37 03 20 N.; 74 31 40 W..	104	47.7	bk. s. m. g...	Rare.
16995	U.S.N.M.	3	D2614...	34 09 00 N.; 76 02 00 W..	168	....	gy. s. bk. sp.	Few.
16996	U.S.N.M.	9	D2639 ..	25 04 50 N.; 80 15 10 W..	56	....	co. s.........	Common.
16997	U.S.N.M.	8	D2641...	25 11 30 N.; 80 10 00 W..	60	69.2	co. s.........	Common.
16998	U.S.N.M.	5	....	Key West, Fla..........	78	....	....	Few.
16999	U.S.N.M.	1	D2668...	30 58 30 N.; 76 50 30 W..	294	46.3	gy. s. dd. co.	Rare.
17000	U.S.N.M.	1	....	Off Turtle Harbor........	50	....	....	Rare.
17001	U.S.N.M.	2	....	Ragged Key, Fla..........	75	....	....	Rare.

TEXTULARIA MEXICANA, new species.

Plate 2, fig. 9.

Textularia rugosa Reuss, var., Goës, Bull. Mus. Comp. Zoöl., vol. 29, 1896, p. 43, pl. 5, figs. 4, 5.

Textularia carinata Flint (not d'Orbigny), Rep. U. S. Nat. Mus., 1897 (1899), p. 284, pl. 29, fig. 1.

Description.—Test much compressed, about one and one-half times as long as broad, the apical end triangular, bluntly pointed, apertural end rounded or slightly angular, periphery sharp, test thickest near the middle, rhomboid in end view; chambers numerous, distinct, broadest at the apertural end, thence concave toward the inferior margin; sutures clear-cut, depressed, wall coarsely arenaceous, roughened, especially over the sutures which are raised, united in the center to form a definite high ridge, especially in the latter half of the test; aperture semicircular, at the base of the inner margin of the last-formed chamber; color grayish-white.

Length up to 1.5 mm.

Distribution.—Type-specimen (U.S.N.M. No. 16948) from *Albatross* station D2377, in the northern part of the Gulf of Mexico, in 210 fathoms (384 meters). It has also occurred at three stations in this immediate vicinity, and a single specimen possibly this species occurred at D2313, off the coast of Georgia. This seems to be a very distinct species found in considerable numbers at these stations, but not occurring elsewhere in the western Atlantic material that I have seen. A study of the Goës collection shows that this is the species from D2399, recorded by him as *T. rugosa*, variety, and Flint's specimens from *Albatross* D2400, which he figures, are the same. This is very close indeed to *T. millettii* Cushman.[12] This species is known from the Hawaiian Islands and from Guam and the coast of Japan. It lacks the very high central ridge of the species from the Gulf of Mexico, and its end view is less broad in consequence. The two are however very closely related. This seems to be another of the species from the Gulf of Mexico which has its relationships in the Pacific rather than the other parts of the Atlantic region.

Texularia mexicana—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
16947	U.S.N.M.	1	D2313...	32 53 00 N.; 77 53 00 W..	99	57.2	crs. s. bk. sp.	Rare.
16948	U.S.N.M.	10	D2377...	29 07 30 N.; 88 08 00 W..	210	67.0	gy. m.......	Common.
16949	U.S.N.M.	7	D2399...	28 44 00 N.; 86 18 00 W..	196	51.6	gy. m.......	Common.
16950	U.S.N.M.	1	D2381...	28 05 00 N.; 87 56 15 W..	1,330	....	lt. br. m....	Rare.
16951	U.S.N.M.	4	D2400...	28 41 00 N.; 86 07 00 W..	169	....	gy. m.......	Few.

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[12] Bull. 71, U. S. Nat. Mus., pt. 2, 1911, p. 13, figs. 18, 19 (in text).

TEXTULARIA FLORIDANA Cushman.

Plate 2, figs. 11, 12.

Textularia transversaria FLINT (not H. B. Brady), Rep. U. S. Nat. Mus., 1897 (1899), p. 283, pl. 28, fig. 4.

Textularia floridana CUSHMAN, Publ. 311, Carnegie Inst. Wash., 1922, p. 24, pl. 1, fig. 7.

Description.—Test elongate, two to three times as long as wide, much compressed, periphery acute, the ends of the chambers forming tubular projections but often broken, showing a truncate or concave area which is hollow, initial end rather sharply pointed, apertural end broadly rounded; chambers numerous, thickest near the center, increasing somewhat in height toward the apertural end; sutures indistinct, slightly if at all depressed, wall finely arenaceous, smooth; aperture small, rounded, at the base of the inner margin of the last-formed chamber.

Length slightly more than 1 mm.

Distribution.—Type-specimen from the Tortugas, Florida (J. A. C. Coll.). Typical specimens from *Albatross* station D2641, in 60 fathoms (110 meters), off the southeast coast of Florida, near Carysfort Light. There are also numerous specimens from a number of stations as far north as the coast of South Carolina and in the Gulf of Mexico. Flint's record for *T. transversaria* is this same type station, and his specimens which I have examined agree with this closely. Another slide in the U.S.N.M. collection from this station is labeled by Flint *T. sagittula*, var. *fistulosa*. The only Atlantic *Challenger* station referred to this later name is No. 33, off Bermuda. The species then has a very definite range, similar to that of many of the species in the Gulf of Mexico and adjacent waters. It is near *T. sagittula*, var. *fistulosa* H. B. Brady, which is common in tropical and subtropical waters in the Indo-Pacific. The test is much smoother, the sutures less distinct, the apical end more pointed, and a comparison of specimens from the two regions show that the two are evidently distinct.

Textularia floridana—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
16952	U.S.N.M.	1	D2317	24 25 45 N.; 81 46 45 W.	45	75.0	co.	Rare.
16953	U.S.N.M.	6	D2318	24 25 45 N.; 81 46 00 W.	45	75.0	co.	Common.
16954	U.S.N.M.	1	D2394	28 38 30 N.; 87 02 00 W.	420	41.8	gn. m.	Rare.
16955	U.S.N.M.	2	D2420	37 03 20 N.; 74 31 40 W.	104	47.7	bk. s. m. g.	Rare.
16956	U.S.N.M.	2	D2614	34 09 00 N.; 76 02 00 W.	168		gy. s. bk. sp.	Rare.
16957	U.S.N.M.	1	D2629	23 48 40 N.; 75 10 40 W.	1,169	38.4	co. s.	Rare.
16958	U.S.N.M.	10	D2639	25 04 50 N.; 80 15 10 W.	56		co. s.	Common.
16959	U.S.N.M.	7	D2641	25 11 30 N.; 80 10 00 W.	60	69.2	co. s.	Common.
16960	U.S.N.M.	5		Off Bell, Fowey, Fla.	22			Few.
16961	U.S.N.M.	1		Off Turtle Harbor.	50			Rare.
16962	U.S.N.M.	2		Long Reef, Fla.	40			Rare.
16963	U.S.N.M.	4		Key West, Fla.	65			Few.
16954	U.S.N.M.	1		Ragged Key, Fla.	75			Rare.

TEXTULARIA PSEUDOTURRIS, new species.

Plate 3, fig. 1.

Textularia turris H. B. Brady (not d'Orbigny), Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 366, pl. 44, figs. 4, 5.

Textularia conica Flint (not d'Orbigny), Rep. U. S. Nat. Mus., 1897 (1899), p. 285, pl. 29, fig. 6.

Description.—Test elongate, tapering, circular or quadrangular in end view, apex bluntly pointed, apertural end concave; chambers numerous, slightly inflated; sutures indistinct, very slightly compressed, wall coarsely arenaceous, rough; aperture rather small, semicircular, in the center of the inner margin of the last-formed chamber; color gray.

Length up to 3 or 4 mm.

Distribution.—Type-specimen (U.S.N.M. No. 17019) from *Albatross* station D2134. Brady referred the *Challenger* material from two stations to this species. These are off Culebra Island, 390 fathoms (713 meters), and off the coast of South America, southeast of Pernambuco, Brazil, 350 fathoms (640 meters). Specimens from *Albatross* station D2314, in 159 fathoms (291 meters), off the coast of Georgia, are very similar to those figured by Brady. Smaller specimens, evidently the young of this species, occurred at a number of stations off the coast of Georgia, from Florida, Cuba, and Yucatan, and off the eastern coast of Brazil. There is a *Challenger* record in the "Summary of Results" volume, off Bermuda. Specimens have been referred to this species from numerous localities, both fossil and recent, but in the western Atlantic it has such a definite form and character that it seems that material from outside this area should be carefully examined to see if it is really the same as this species or the Cretaceous one of d'Orbigny. Pearcey refers specimens from the warm area of Faroe Channel and Heron-Allen and Earland specimens from the west of Scotland to this species. Flint's specimens which I have examined, marked *T. conica*, from D2641, off Carysfort Light, Florida, belong here.

Textularia pseudoturris—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
17018	U.S.N.M.	2	D2314	32 43 00 N.; 77 51 00 W..	159	47.4	crs. s. bk. sp.	Rare.
17019	U.S.N.M.	1	D2352	22 35 00 N.; 84 23 00 W..	463	45.0	wh. co......	Rare.
17020	U.S.N.M.	1	D2355	20 56 48 N.; 86 27 00 W..	399	....	yl. oz.......	Rare.
17021	U.S.N.M.	5	D2639	25 04 50 N.; 80 15 10 W..	56	....	co. s.........	Few.
17022	U.S.N.M.	1	D2641	25 11 30 N.; 80 10 00 W..	60	69.2	co. s.........	Rare.
17023	U.S.N.M.	2	D2668	30 58 30 N.; 79 38 30 W..	294	46.3	gy. s. dd. co.	Rare.
17024	U.S.N.M.	5	D2758	6 59 00 S.; 34 47 00 W..	20	79.0	brk. sh......	Few.

TEXTULARIA BARRETTII Jones and Parker.

Plate 3, figs. 3-6.

Textularia barrettii Jones and Parker, Rep. British Association, Newcastle Meeting, 1863, pp. 80, 105; Ann. Soc. Mal. Belg., vol. 11, 1876, p. 99, woodcut.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 367, pl. 44, figs. 6-8.—Woodward, Journ. New York Micr. Soc., 1885, p. 149.—Flint, Rep. U. S. Nat. Mus., 1897 (1899), p. 285, pl. 30, fig. 2.—Cushman, Publ. 291, Carnegie Inst. Wash., 1919, p. 31, pl. 6, figs. 5-7.

Textularia conica Goës (not d'Orbigny), Bull. Mus. Comp. Zoöl., vol. 29, 1896, p. 43.

Description.—Test tapering, about twice as long as broad, very slightly compressed, broadest near the apertural end, the apical end bluntly pointed, later portion of the test often with nearly straight sides; chambers distinct, numerous, labyrinthic; sutures very clearly marked, not depressed, wall finely arenaceous with an abundance of cement, very smoothly finished; aperture a narrow slit at the base of the inner margin of the last-formed chamber, the sides of the chamber slightly projecting beyond it on each side, sometimes subdivided into one or more openings.

Length up to 4.5 mm.

Distribution.—Brady gives the following Atlantic records: Off Bermuda, 435 fathoms (796 meters); off Culebra Island, West Indies, 390 fathoms (713 meters); off Jamaica, 100 to 250 fathoms (183 to 457 meters), and southeast of Pernambuco, Brazil, 350 fathoms (640 meters). Flint's specimens were from off Little Bahama Bank, *Albatross* station D2655, in 338 fathoms (619 meters). I have found the species to be very abundant at numerous stations in less than 100 fathoms (183 meters) off the southern coast of Florida, and it has also occurred in the Gulf of Mexico and off the southeastern coast of the United States. This is a very striking species in its labyrinthic chambers and the neatly finished exterior with its clear-cut finely drawn sutural lines. Some of the specimens off Key West in 78 fathoms (143 meters), and off the Barbados in 100 fathoms (183 meters), are very large and broad. They represent the microspheric form of the species. Elsewhere the length is usually not over 2-3 mm.

An examination of the Goës collection shows this species under the name of *T. conica*.

Textularia barrettii—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°*F.*		
16925	U.S.N.M.	10	D2314	32 43 00 N.; 77 51 00 W.	159	47.4	crs. s. bk. sp.	Common.
16926	U.S.N.M.	10	D2315	24 26 00 N.; 81 48 15 W.	37		co.	Common.
16927	U.S.N.M.	7	D2377	24 25 45 N.; 81 46 45 W.	45	75.0	co.	Common.
16928	U.S.N.M.	1	D2378	29 14 30 N.; 88 09 30 W.	68		gy. m.	Rare.
16929	U.S.N.M.	2	D2399	28 44 00 N.; 86 18 00 W.	196	51.6	gy. m.	Rare.
16930	U.S.N.M.	4	D2404	28 44 00 N.; 85 16 00 W.	60		gy. s.	Few.
16931	U.S.N.M.	1	D2648	25 53 00 N.; 80 03 30 W.	84		gn. m.	Rare.
16932	U.S.N.M.	3	D2655	27 22 00 N.; 78 07 30 W.	338	47.5	gy. s.	Rare.
16933	U.S.N.M.	10		Fowey, Fla.	55			Common.
16934	U.S.N.M.	3		Off Barbados	100			Few.
16935	U.S.N.M.	10		Off Ragged Key, Fla.	75			Common.
16936	U.S.N.M.	2		Govt. Cut, Fla.	100			Rare.
16937	U.S.N.M.	1		Off Turtle Harbor	50			Rare.
16938	U.S.N.M.	10		Long Reef, Fla.	40			Common.
16939	U.S.N.M.	10		Key West, Fla.	65			Common.
16940	U.S.N.M.	10		Key West, Fla.	78			Common.
16941	U.S.N.M.	3		Key West, Fla.	98			Few.
16942	U.S.N.M.	5		Sand Key	92			Few.
16943	U.S.N.M.	10		Sambo	50			Common.
16944	U.S.N.M.	10	*Fish Hawk* 949	40° 03′ 00″ N.; 70° 31′ 00″ W.	100	52.0	yl. m.	Common.
16945	U.S.N.M.	10		Ajax Reef, Fla.	40			Common.

TEXTULARIA PSEUDOTROCHUS, new species.

Plate 5, figs. 1–3.

Textularia trochus H. B. Brady (part), Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 366, pl. 43, figs. 15, 16, 18.

Description.—Test broader than long, forming a low broad cone, the apex bluntly rounded, the apertural end flattened or concave; chambers few, distinct; sutures distinct, not depressed, wall rather coarsely arenaceous but smoothly finished with an abundance of dark gray cement; aperture nearly straight, a very narrow slit in the central part of the inner margin of the last-formed chamber, with a thin, overhanging lip; color gray.

Diameter 1 mm. or slightly more.

Distribution.—Type-specimen (U.S.N.M. No. 17014) from *Albatross* station D2641 off the southern coast of Florida in 60 fathoms (110 meters). The common West Indian shallow-water species referred to *T. trochus* when compared with the original Cretaceous specimens of Brady seems to be an entirely different form. Brady's figures show a sharply conical test coming to an acute point with concave sides, while the West Indian species has a very blunt often broadly rounded apex and convex sides. It occurs as far north as the Delaware Capes, southward along the coast, becoming abundant off the coast of Florida in water between 50 and 100 fathoms (91 and 183 meters) in depth. There are other records from the Bahamas and in the northern part of the Gulf of Mexico, and Brady records it from off the Danish West Indies and off Bermuda. *T. trochus* as a recent species is recorded from very widely scattered regions, but figures are not usually given and it is difficult to tell whether this species so common in the West Indies is the same as that found elsewhere. The West Indies species is certainly not the same as *T. trochus* d'Orbigny.

Textularia pseudotrochus—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
17007	U.S.N.M.	1	D2263...	37 08 00 N.; 74 33 00 W.	430	....	gn. m.......	Rare.
17008	U.S.N.M.	3	D2312...	32 54 00 N.; 77 53 30 W.	88	57.8	crs. s. bk. sp.	Few.
17009	U.S.N.M.	5	D2313...	32 53 00 N.; 77 53 00 W.	99	57.2	crs. s. bk. sp.	Few.
17010	U.S.N.M.	1	D2318...	24 25 45 N.; 81 46 00 W.	45	75.0	co...........	Rare.
17011	U.S.N.M.	1	D2381...	28 05 00 N.; 87 56 15 W.	1330	....	lt. br. m.....	Rare.
17012	U.S.N.M.	1	D2629...	23 48 40 N.; 75 10 40 W.	1169	38.4	co. s.........	Rare.
17013	U.S.N.M.	8	D2639...	25 04 50 N.; 80 15 10 W.	56	....	co. s.........	Common.
17014	U.S.N.M.	5	D2641...	25 11 30 N.; 80 10 00 W.	60	69.2	co. s.........	Few.
17015	U.S.N.M.	1	....	Ragged Key, Fla.........	75	....	....	Rare.
17016	U.S.N.M.	10	....	Fowey, Fla., E by S.....	55	....	....	Common.
17017	U.S.N.M.	1	....	Off Turtle Harbor........	50	....	....	Rare.

TEXTULARIA CONICA d'Orbigny.

Plate 5, figs. 5–7.

Textularia conica D'ORBIGNY, in De la Sagra, Hist. Fis. Pol. Nat. Cuba, 1839, "Foraminifères," p. 143, pl. 1, figs. 19, 20.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 365, pl. 43, figs. 13, 14; pl. 113, fig. 1.—CHAPMAN, Proc. Zool. Soc. London, 1895, p. 19.—GOËS, Bull. Mus. Comp. Zoöl., vol. 29, 1896, p. 43.—CHAPMAN, Journ. Linn. Soc. London, vol. 28, 1902, pp. 185, 382; Trans. New Zealand Inst., vol. 38, 1905, p. 86; Journ. Quekett Micr. Club, 1907, p. 126.—HERON-ALLEN and EARLAND, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 55.—PEARCEY, Trans. Roy Soc. Edinburgh, vol. 49, 1914, p. 1012.—HERON-ALLEN and EARLAND, Journ. Roy. Micr. Soc., 1916, p. 42; Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 230.—MESTAYER, Trans. New Zealand Inst., vol. 48, 1916, p. 129.—CUSHMAN, Proc. U. S. Nat. Mus., vol. 59, 1921, p. 50, pl. 11, figs. 4–6; Bull. 100, U. S. Nat. Mus, vol. 4, 1921, p. 123, pl. 25, figs. 2a–c; Publ. 311, Carnegie Inst. Wash., 1922, p. 24, pl. 2, fig. 4.

Description.—Test usually wider than high, triangular in front view, broadly oval in end view, slightly compressed, apex bluntly pointed; chambers comparatively few, distinct; sutures distinct, slightly depressed, wall arenaceous, smooth, or slightly roughened; aperture a narrow slit at the base of the inner margin of the last-formed chamber; color gray.

Length 1 mm. or less.

Distribution.—The original specimens which d'Orbigny had were from Cuba and Jamaica in shallow water. I have had it from Montego Bay in 9 and 10 fathoms (16 and 18 meters), and it has occurred at *Albatross* stations southward from the coast of South Carolina, off the coast of Florida, and the northern part of the Gulf of Mexico, and in the Caribbean. The *Challenger* Atlantic records are off the Danish West Indies and off Bermuda. I have not seen specimens in the abundant material north of Cape Hatteras, nor in the deep water of the Caribbean. According to the records it seems to be widely distributed in the tropical regions. According to Heron-Allen and Earland it is abundant off the British coasts.

Williamson's figure named *T. cuneiformis*, var. *conica*, resembles this species in general but is apparently not the same as the tropical form.

Textularia conica—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
16983	U.S.N.M.	1	D2358...	20 19 00 N.; 87 03 30 W..	222	....	fne. wh. co..	Rare.
16984	U.S.N.M.	1	D2371...	29 17 00 N.; 85 30 45 W..	26	....	gy.s.brk.sh..	Rare.
16985	U.S.N.M.	1	D2614...	34 09 00 N.; 76 02 00 W..	168	....	gy. s. bk. sp..	Rare.
16986	U.S.N.M.	3	D2639...	25 04 50 N.; 80 15 10 W..	56	....	co. s.........	Few.
16987	U.S.N.M.	4	D2641...	25 11 30 N.; 80 10 00 W..	60	69.2	co. s.........	Few.

Genus BIGENERINA d'Orbigny, 1826.

Bigenerina D'ORBIGNY (type, *B. nodosaria* d'Orbigny), Ann. Sci. Nat., vol. 7, 1826, p. 261.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 368.—CHAPMAN, The Foraminifera, 1902, p. 168.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 2, 1911, p. 27.

Gemmulina D'ORBIGNY, Ann. Sci. Nat., vol. 7, 1826, p. 262.

Description.—Test free, generally elongate, cylindrical or compressed, the early portion textularian, composed of a series of biserially arranged chambers, later chambers arranged in a single line; wall usually thick, arenaceous, usually coarse but often smoothly finished; aperture in the young at the base of the inner margin of the last-formed chamber, as in *Textularia*, but in the adult, in the uniserial portion terminal, rounded or oval according to the form of the chamber.

Both miscropheric and megalospheric forms occur in the various species. In the microspheric form as in the same form in *Textularia* the earliest chambers may be arranged in a planospiral manner. In the megalospheric form the coiled chambers are usually wanting and the test starts with the biserial arrangement. As is usual with other foraminifera the microspheric form of the species attains a larger size in the adult than does the megalospheric

From its developmental stages it is very evident that *Bigenerina* represents a series derived from *Spiroplecta* through *Textularia*, and is very closely allied to the latter. There are various stages in the acceleration of development shown by various species. In some the biserial series makes up the larger part of the test, the uniserial series being only in the last-formed portion. In others the biserial series is confined to the very early development and the larger part of the test is uniserial. In the former cases specimens are often found which have not yet reached the adult uniserial condition, and would be taken for a species of *Textularia* were it not for their association with adults with the full characters of *Bigenerina*. Such specimens occur in the West Indies, especially those of *Bigenerina capreolus* as is noted under that species.

Well characterized species of *Bigenerina* occur in the Tertiary from the Eocene onward. In the Palaeozoic, especially in the Carboniferous, specimens occur which may possibly belong generically to *Bigenerina*, but their structure should be carefully studied to be sure of this. At any rate they are closely allied in general form.

BIGENERINA NODOSARIA d'Orbigny.

Bigenerina nodosaria D'ORBIGNY, Ann. Sci. Nat., vol. 7, 1826, p. 261, pl. 11, figs. 9–11; Modèles, 1826, No. 57.—PARKER, JONES, and H. B. BRADY, Ann. Mag. Nat. Hist., ser. 3, vol. 16, 1865, p. 28, pl. 2, fig. 62.—TERRIGI, Atti Acc. Pont. Nuovi Lincei, vol. 33, 1880, p. 192, pl. 2, fig. 28.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 369, pl. 44, figs. 14–18; Journ. Roy. Micr. Soc., 1887, p. 895.—WRIGHT, Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 471.—GOËS, Köngl. Svensk. Vet. Akad. Handl., vol. 25, No. 9, 1894, p. 37, pl. 7, figs. 313–315 [316–323?].—FORNASINI, Mem. Accad. Sci. Bologna, ser. 5, vol. 10, 1901, p. 12; 1903, p. 142, pl. O, figs. 12, 13.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 2, 1911, p. 27, figs. 46–48 (in text); Bull. 100, U. S. Nat. Mus., vol. 4, 1921, p. 125, pl. 26, fig. 2; Publ. 311, Carnegie Inst. Wash., 1922, p. 25, pl. 2, figs. 5, 6.

Description.—Test elongate, subcylindrical, the early portion somewhat compressed, consisting of a biserial group of chambers, broader than the succeeding uniserial group, later portion cylindrical or slightly tapering; chambers distinct, those of the early portion typically more numerous than those of the uniserial portion, the latter being 3–5 in number; sutures usually distinct, slightly depressed; wall rather coarsely arenaceous with a grayish-white cement; aperture of the early portions as in *Textularia*, an elongate slit between the base of the inner margin of the chamber and the adjacent wall of the preceding chamber, in the uniserial portion rounded and terminal; color white or light gray.

Length up to nearly 2 mm.

Distribution.—D'Orbigny described this species from the Adriatic Sea. His Modèle shows a rather smooth form. In typical European material which I have seen from off the coast of the British Isles the biserial compressed portion makes up usually one-third or more of the total length of the chamber. It seems to be common about the British Isles from the numerous records given above. In the western Atlantic however it does not appear, at least in its typical form, and is replaced by the following variety.

Bigenerina nodosaria—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
......	J. A. C...	4	*Flying Falcon.*	° ′ ″ ° ′ ″ 51 02 00 N.; 11 27 00 W..	345	....	....	Few.

BIGENERINA NODOSARIA d'Orbigny, var. TEXTULARIOIDEA Goës.

Plate 5, figs. 8, 9.

Textularia sagittula DEFRANCE, forma *Bigenerina* Goës, Köngl. Svensk. Vet. Akad. Handl., vol. 19, pt. 4, 1882, p. 78, pl. 5, figs. 159, 160.

Clavulina textularioidea Goës, Köngl. Svensk. Vet. Akad. Handl., vol. 25, 1894, p. 42, pl. 8, figs. 387–399; Bull. Mus. Comp. Zoöl., vol. 29, 1896, p. 37, pl. 4, figs. 26–38.

Bigenerina nodosaria FLINT, Rep. U. S. Nat. Mus., 1897 (1899), p. 286, pl. 31, fig. 4.—CUSHMAN, Proc. U. S. Nat. Mus., vol. 59, 1921, p. 51.

Description.—Variety differing from the typical in the larger size and much greater proportion of the uniserial stage and reduction of the biserial portion, and in the relation of the two, the last-formed chambers of the test being often greater in size than the entire biserial portion.

Length 3–5 mm.

Distribution.—Goës described this in the Caribbean as frequent at a depth of 300 meters (164 fathoms). In looking over the material in the Goës collection I find a series of ten specimens, evidently this variety from *Albatross* station D2315 in 159 fathoms (291 meters). These are marked "*Clavulina parisiensis*, var. *bigerinoides*." This name does not appear under *Clavulina* in the 1896 paper, but on page 9, in the list of species from D2315, this name was found. Immature specimens of this species resemble the typical form, but the adults show very great differences. The Textularian portion is very small compared to the size of the adult test, and the last-formed chambers of the uniserial portion typically being large and globose are often several times the size of the entire biserial portion. It occurs also in shallow water off the northern coast of Jamaica and the Tortugas region.

Bigenerina nodosaria, var. textularioidea—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
16879	U.S.N.M.	10	D2315...	24 26 00 N.; 81 48 15 W..	37	....	co...........	Common.
16880	U.S.N.M.	5	D2318...	24 25 45 N.; 81 46 00 W..	45	75.0	co...........	Few.
16881	U.S.N.M.	1	D2339...	23 10 40 N.; 82 20 15 W..	191	....	co...........	Rare.
16882	U.S.N.M.	2	D2370...	29 18 15 N.; 85 32 00 W..	25	....	crs.s.brk.sh.	Rare.
16883	U.S.N.M.	1	D2371...	29 17 00 N.; 85 30 45 W..	26	....	gy.s.brk.sh.	Rare.
16884	U.S.N.M.	1	D2406...	28 46 00 N.; 84 49 00 W..	26	....	crs. s. co.....	Rare.
16885	U.S.N.M.	3	D2629...	23 48 40 N.; 75 10 40 W..	1,169	38.4	co. s.........	Rare.
16886	U.S.N.M.	3	D2639...	25 04 50 N.; 80 15 10 W..	56	....	co. s.........	Rare.
16887	U.S.N.M.	10	D2641...	25 11 30 N.; 80 10 00 W..	60	69.2	co. s.........	Common.
16888	U.S.N.M.	2	D2758...	6 59 00 S.; 34 47 00 W..	20	79.0	brk. sh......	Rare.
16889	U.S.N.M.	1	....	Off Fowey Rocks, Fla., E. by ½ E.	70	....	....	Rare.
16890	U.S.N.M.	1	....	Off Barbados............	22	....	....	Rare.

BIGENERINA CYLINDRICA, new name.

Plate 3, figs. 7, 8.

Bigenerina digitata H. B. Brady (not d'Orbigny), Trans. Linn. Soc. London, vol. 24, 1864, p. 468, pl. 48, fig. 8; Nat. Hist. Trans. Northumberland, vol. 1, 1865–67, p. 102, pl. 12, fig. 7.—Parker, Jones, and H. B. Brady, Ann. Mag. Nat. Hist., ser. 3, vol. 16, 1865, p. 28, pl. 2, fig. 61.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 370, pl. 44, figs. 19–24; Journ. Roy. Micr. Soc., 1887, p. 895.—Wright, Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 471.—Robertson, Trans. Nat. Hist. Soc. Glasgow, vol. 3, pt. 3, 1892, p. 240.—Fornasini, Mem. Acad. Sci. Bologna, ser. 5, vol. 10, 1901, p. 12.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 2, 1911, p. 28, figs. 49*a*, *b*.—Heron-Allen and Earland, Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 231.

Description.—Test fusiform or cylindrical, elongate, rounded in cross section, the early portion consisting of a number of chambers arranged biserially, but circular in cross section; sutures somewhat indistinct, apex bluntly rounded, later portion consisting of a number of chambers arranged uniserially; division between the two portions not marked by a difference in size; wall rather coarsely arenaceous, but the particles neatly cemented with a reddish-brown cement to form a nearly smooth surface; aperture rounded, small, usually in the middle of the apertural face.

Length 1.0–1.6 mm.

Distribution.—This species which seems to be very common at least in certain places off the northwestern coast of Europe and the British Isles and elsewhere is not the same at all as d'Orbigny's Modèle. Brady and subsequently other authors following him have referred this recent species to the name given by d'Orbigny for a peculiar form from the Mediterranean. If the Modèle is at all correct, d'Orbigny's *Gemmulina digitata* is a very different thing. The figures in the *Challenger* Report referred by Brady to *Bigenerina digitata* are very characteristic of specimens which I have had through the kindness of Mr. Joseph Wright from the dredgings of the *Flying Falcon,* southwest of Ireland in 53 fathoms (97 meters). At this station specimens are very abundant and except for certain minor characters show very little variation in essentials. In all the western Atlantic material that I have examined there seem to be nothing which at all fits this European species. I have specimens in my own collection from Log 8, *Flying Falcon,* 11 miles south of Glandore Harbor, southwest of Ireland, 53 fathoms (97 meters).

Bigenerina cylindrica—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
17273	U.S.N.M.	2	....	*Flying Falcon*..........	53	......	....	Rare.
......	J.A.C....	10	....	*Flying Falcon*, southwest of Ireland.	53	......	....	Common.
......	J.A.C....	3	....	Dröbach, Norway.......	......	......	....	Rare.

BIGENERINA PENNATULA (Batsch).

Plate 5, fig. 4.

"Orthoceratia Pupa," SOLDANI, Test., vol. 1, pt. 2, 1791, p. 99, pl. 108, figs. *D, E, F.*

Nautilus (Orthoceras) pennatula BATSCH, Conch. Seesandes, 1791, No. 13, pl. 4, figs. 13*a–d.*

Bigenerina pennatula H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 373, pl. 45, figs. 5–8.—GOËS, Bull. Mus. Comp. Zoöl., vol. 29, 1896, p. 44.—FLINT, Rep. U. S. Nat. Mus., 1897 (1899), p. 287, pl. 32, fig. 2.—CUSHMAN, Bull. 100, U. S. Nat. Mus., vol. 4, 1921, p. 127, pl. 25, figs. 3*a, b.*

Vulvulina elegans D'ORBIGNY, Ann. Sci. Nat., vol. 7, 1826, p. 264, no. 3.

Grammostomum elegans PARKER, JONES, and H. B. BRADY, Ann. Mag. Nat. Hist., ser. 4, vol. 8, 1871, p. 170, pl. 11, figs. 121, 123.

Description.—Test much compressed, in the adult usually twice as long as wide, the early biserial portion making up at least one-half the test, broader than the following 1–4 chambers of the uniserial portion, periphery acute, that of the early portion often pectinate; chambers distinct, those of the uniserial portion somewhat inflated; sutures of the early portion raised, confluent along the median line, those of the uniserial part simple and depressed, wall finely arenaceous, in the biserial portion roughened, especially on the sutures and the later chambers smooth; aperture in the early part textularian, in the uniserial portion becoming much elongated, narrow, terminal, central; color in the early portion yellowish-brown, the uniserial chambers gray.

Length up to 2 mm.

Distribution.—This species is usually found in company with the preceding. Its geographical distribution is very similar. In the *Albatross* material it has been found at a large number of stations, including one in the northern part of the Gulf of Mexico, four off the southeast coast of the United States, and one in the Carribean, off Yucatan.

This species differs from the preceding in having the biserial portion much more bluntly rounded, and often with a yellowish color, which is lacking in *B. capreolus.* The biserial portion is also much broader in comparison with its length. Some of the specimens show the spiral arrangement of the early chambers, showing the relationship of this genus to *Textularia* and *Spiroplecta.*

Bigenerina pennatula—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
16870	U.S.N.M.	2	D2150...	13 34 45 N.; 81 21 10 W..	382	45.8	wh. crs. s....	Rare.
16871	U.S.N.M.	1	D2355...	20 56 48 N.; 86 27 00 W..	399	....	yl. oz........	Rare.
16872	U.S.N.M.	1	D2378...	29 14 30 N.; 88 09 30 W..	68	....	gy. m.......	Rare.
16873	U.S.N.M.	3	D2416...	31 26 00 N.; 79 07 00 W..	276	53.8	co. brk. sh..	Rare.
16874	U.S.N.M.	2	D2668...	30 58 30 N.; 79 38 30 W..	294	46.3	gy. s. dd. co.	Rare.
16875	U.S.N.M.	1	D2677...	32 39 00 N.; 76 50 30 W..	478	39.3	gn. m.......	Rare.

BIGENERINA CAPREOLUS (d'Orbigny).

Plate 5, fig. 10.

Vulvulina capreolus D'ORBIGNY, Ann. Sci. Nat., vol. 7, 1826, p. 264, No. 1, pl. 11, figs. 5, 6; Modèles, 1826, No. 59.

Grammostomum capreolus PARKER and JONES, Ann. Mag. Nat. Hist., ser. 3, vol. 11, 1863, p. 93.

Bigenerina capreolus H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 372, pl. 45, figs. 1-4.—GOËS, Bull. Mus. Comp. Zoöl., vol. 29, 1896, p. 44.—FLINT, Rep. U. S. Nat. Mus., 1897 (1899), p. 286, pl. 32, fig. 3.—CUSHMAN, Bull. 100, U. S. Nat. Mus., vol. 4, 1921, p. 127, pl. 26, figs. 1*a*, *b*.

Description.—Test compressed, slightly longer than wide, the biserial portion occupying the larger part of the test, uniserial stage represented by only one or two chambers, somewhat less in width than the preceding part of the test, periphery acute, more or less pectinate; chambers distinct, especially those in the later portion; sutures limbate, raised, confluent along the middle line of the test, in the later portion depressed, wall arenaceous, in the early portion more or less roughened and the last uniserial chambers smoothly finished; aperture of the biserial part Textularian, the later portion terminal, central, much elongated, narrow; color gray.

Length up to 2.5 mm.

Distribution.—The type-specimens of this species are recorded by d'Orbigny from the Adriatic Sea. There are numerous records for this species in the Atlantic, several being given by Brady off the Azores, 450 fathoms (823 meters); off the Canaries, 600 fathoms (1,097 meters); off the Danish West Indies, 390 and 450 fathoms (713 and 823 meters), and off the coast of Brazil, near Pernambuco, 350 and 675 fathoms (640 and 1,234 meters). Brady also records it from some of the *Porcupine* dredgings as far north as 59° N. latitude. Goës records it as very rare in 399 fathoms (730 meters), in the Caribbean, at *Albatross* station D2355. Flint's specimens were from *Albatross* station D2416, off the coast of Georgia, in 276 fathoms (505 meters). I have had specimens from this station, also from station D2415 in the same region, 440 fathoms (805 meters), and at D2355, the station from which Goës records this species.

Bigenerina capreolus—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundanc
				° ′ ″ ° ′ ″		°F.		
16876	U.S.N.M.	1	D2355...	20 56 48 N.; 86 27 00 W..	399	......	yl. oz.......	Rare.
16877	U.S.N.M.	1	D2415...	30 44 00 N.; 79 26 00 W..	440	45.6	co. crs. s.....	Rare.
16878	U.S.N.M.	1	D2416...	31 26 00 N.; 79 07 00 W..	276	53.8	co. brk. sh..	Rare.
......	J.A.C....	3	*Porcupine.* 16.......	Northwest of Ireland.....	994	......	....	Few.

BIGENERINA ROBUSTA Brady.

Bigenerina robusta Brady, Quart. Journ. Micr. Sci., vol. 21, 1881, p. 53; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 371, pl. 45, figs. 9–16.—Flint, Rep. U. S. Nat. Mus., 1897 (1899), p. 286, pl. 32, fig. 1.

Description.—"Test elongate, subcylindrical; early portion compressed, and tapering to a blunt point, composed of a number of segments arranged, as in *Textularia*, in two more or less regular alternating series: later portion cylindrical, convex or truncate at the distal end; consisting of numerous very short segments, the marginal outline of which is often ventricose and irregular. Aperture in the early stage Textularian in form and position; in adult specimens terminal and porous."

Length, ⅙ inch (4.2 mm.), sometimes more.

Distribution.—Brady's records for this species are all in the Atlantic, *Challenger* station 24, off Culebra Island, West Indies, 390 fathoms (713 meters); station 122, southeast of Pernambuco, Brazil, 350 fathoms (640 meters), and in one dredging in shallower water off the Shetland Islands. In the *Challenger* volume, "Summary of Results," it is recorded from station 23, off Sombrero Island, West Indies, 450 fathoms (823 meters). Flint records it from *Albatross* station D2150 in 382 fathoms (697 meters), off Old Providence Island, south of Yucatan. I have not found in the *Albatross* material any specimens which seem to belong to this species. The description above is that of Brady. This species is peculiar in its aperture which consists of several small openings instead of a single one. In this respect it seems more like some of the older fossil forms than the other recent species of the genus.

Genus BOLIVINA d'Orbigny, 1839.

Bolivina d'Orbigny (type, *B. plicata* d'Orbigny), Voy. Amér. Mérid., vol. 5, pt. 5, 1839, p. 61.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 416.—Chapman, The Foraminifera, 1920, p. 173.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 2, 1911, p. 31.

Description.—Test elongate, distinctly biserial throughout; wall usually thin and hyaline in the young, but becoming thickened with age in many species, ornamented by punctae, striae, costae, knobs, and spines, with carinae developed in some species; aperture elongate, usually symmetrical.

As already noted in the Pacific work, the species of this genus for the most part seem to be very local in their distribution. As stated there this is especially true of species of tropical and subtropical seas. A comparison of material from the eastern and western Atlantic, from the Caribbean and the Gulf of Mexico, with that of colder parts of the Atlantic and with the Pacific, shows that most of the species, if carefully studied, are not widely spread. This was shown by the number of new species which Brady felt compelled to describe in the *Challenger* Report. Most of the species are small and inconspicuous and show surprisingly little variation, at least in tropical and subtropical regions.

There is a tendency in the later development of certain species to initiate a uniserial stage. The chambers instead of going only halfway across the test extend to the opposite side and the aperture becomes terminal. Such species are referred to the subgenus *Bifarina.*

BOLIVINA BEYRICHI Reuss.

Plate 9, fig. 6.

Bolivina beyrichi Reuss, Zeitschr. Deutsch. geol. Gesellsch., vol. 3, 1851, p. 83, pl. 6, fig. 51.—Hantken, Mitth. Jahrb. Ung. geol. Anstalt, vol. 4, 1875 (1881), p. 64, pl. 7, fig. 11.—Terrigi, Atti Accad. Pont. Nuovi Lincei, vol. 33, 1880, p. 198, pl. 2, figs. 43–45; vol. 35, 1883, p. 191, pl. 3, fig. 33.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 422, pl. 53, fig. 1.—Egger, Abh. kön. bay. Akad. Wiss. München, Cl. II, vol. 18, 1893, p. 296, pl. 8, figs. 24–26.—Chapman, Proc. Zool. Soc. London, 1895, p. 24.—Goës, Bull. Mus. Comp. Zoöl., vol. 29, 1896, p. 47.—Jones and Chapman, Monogr. Christmas Island, 1900, p. 231.—Heron-Allen and Earland, Journ. Roy. Micr. Soc., 1908, p. 334.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 2, 1911, p. 34, fig. 56 (in text).—Bagg, Bull. 513, U. S. Geol. Survey, 1912, p. 40, pl. 10, fig. 10.—Chapman, Zool. Res. *Endeavour*, 1912, p. 310; 1915, p. 19.—Heron-Allen and Earland, Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 239, pl. 41, fig. 15.—Sidebottom, Journ. Roy. Micr. Soc., 1918, p. 126.—Cushman, Bull. 100, U. S. Nat. Mus., vol. 4, 1921, p. 128.

Description.—Test elongate, rather narrow, much compressed, slightly tapering to the round-pointed apical end, apertural end evenly rounded; chambers numerous, high at the posterior outer edge, each projecting backward in a spinose projection; wall smooth, punctate; aperture elongate; color white.

Length slightly less than 1 mm.

Distribution.—The only Atlantic stations given by Brady in the *Challenger* Report are off the Canaries, 600 and 1,125 fathoms (1,097 and 2,057 meters). Heron-Allen and Earland record it from the west of Scotland. There are numerous other records, mostly from the Pacific.

BOLIVINA BEYRICHI Reuss, var. ALATA (Seguenza).

Plate 8, fig. 3.

Vulvulina alata Seguenza, Atti Accad. Gioenia Sci. Nat., ser. 2, vol. 18, 1862, p. 115, pl. 2, figs. 5, 5*a*.

Bolivina alata Egger, Abh. kön. bay. Akad. Wiss. München, Cl. II, vol. 18, 1893, p. 296, pl. 8, fig. 27.

Bolivina beyrichi Reuss, var. *alata* H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 422, pl. 53, figs. 2–4.—Bagg, Maryland Geol. Survey, Miocene, 1904, p. 473, pl. 132, fig. 4.—Sidebottom, Mem. Proc. Manchester Lit. Philos. Soc., vol. 54, pt. 3, 1910, p. 13.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 2, 1911, p. 35, figs. 57*a*, *b* (in text).—Bagg, Bull. 513, U. S. Geol. Survey, 1912, p. 40, pl. 10, figs. 7–9.—Cushman, Bull. 676, U. S. Geol. Survey, 1918, p. 49.—Sidebottom, Journ. Roy. Micr. Soc., 1918, p. 126.—Cushman, Bull. 100, U. S. Nat. Mus., vol. 4, 1921, p. 129.

Bolivina beyrichi Reuss, var. *carinata* Hantken, Magy. kir. földt. int. évkönyve, vol. 4, 1875 (1876), pl. 7, fig. 12; Mitth. Jahrb. Ung. geol. Anstalt, vol. 4, 1875 (1881), pl. 7, fig. 12.

Description.—Test differing from that of the typical form of the species by the wide peripheral flange; it is also broader and much more tapering.

Length about 1 mm.

Distribution.—The only Atlantic record for this variety is that given by Brady in the *Challenger* Report, off Cezimbera, south of Lisbon, in 50 fathoms (91 meters). In the *Albatross* material specimens which may be referred to this variety occurred at four stations, one southeast of Nantucket, one off the coast of Carolina, one in the Gulf of Mexico, and one off the southeast coast of Brazil. The record of Goës for *B. beyrichi* from the Caribbean is probably this variety.

Bolivina beyrichi, var. alata—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
17072	U.S.N.M.	1	D2249...	40 11 00 N.; 69 52 00 W..	53	51.4	gn. m. fne. s..	Rare.
17073	U.S.N.M.	1	D2378...	29 14 30 N.; 88 09 00 W..	68	....	gy. m........	Rare.
17074	U.S.N.M.	1	D2614...	34 09 00 N.; 76 02 00 W..	168	....	gy. s. bk. sp.	Rare.
17075	U.S.N.M.	1	D2761...	15 39 00 S.; 38 32 54 W..	818	39.0	ptor. oz......	Rare.

BOLIVINA ALBATROSSI, new species.

Plate 6, fig. 4.

Description.—Test short, small, rather thick, periphery rounded, initial end broadly rounded, early portion marked by a network of fine reticulations, later portion smooth; chambers comparatively few, those of the later portion distinct; sutures distinct except in the early portion, not depressed, slightly limbate, wall translucent, finely punctate; aperture narrow, slightly elongate.

Length 0.25–0.30 mm.

Distribution.—Type-specimen (U.S.N.M. No. 17098) from *Albatross* station D2677, in 478 fathoms (873 meters), off the Carolina coast. There is also a single specimen from *Albatross* station D2398 in the Gulf of Mexico. This species is peculiar in its rounded form, closely set chambers, and the reticulations of the early portion.

In the "Summary of Results" volume of the *Challenger* Report *B. reticulata* is recorded from off the West Indies at station 23, 400 fathoms (732 meters). This may be the present species.

Bolivina albatrossi—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
17097	U.S.N.M.	1	D2398...	28 45 00 N.; 86 26 00 W..	227	48.6	gy. m......	Rare.
17098	U.S.N.M.	2	D2677...	32 39 00 N.; 76 50 30 W..	478	39.3	gn. m.......	Rare.

BOLIVINA CAMPANULATA Egger.

Bolivina campanulata EGGER, Abh. kön. bay, Akad. Wiss. München, Cl. II, vol. 18, 1893, p. 401, pl. 8, figs. 53, 54.

Among other stations from which Egger describes this minute species is *Gazelle* Station 3, in 5,301 meters (2,899 fathoms), west of Portugal.

BOLIVINA COSTATA d'Orbigny.

Some of the earlier records from the British Isles are given under this name, but it is not recorded by recent writers from this region. Without specimens it is difficult to determine just what was the form referred to.

BOLIVINA DECUSSATA H. B. Brady.

Bolivina decussata H. B. BRADY, Quart. Journ. Micr. Sci., vol. 21, 1881, p. 58; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 423, pl. 53, figs. 12, 13.—WRIGHT, Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 475.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 2, 1911, p. 47, fig. 77 (in text).—SIDEBOTTOM, Journ. Roy. Micr. Soc., 1918, p. 128.

The only Atlantic record referred to this name is that of Wright given above. He records the species as common at 1,020 fathoms (1,866 meters) off the southwest coast of Ireland. In the material sent me by Mr. Wright I have found specimens which are evidently what he has referred to this name, but they are not like the Pacific material which I have seen, and I doubt very much if they are the same.

BOLIVINA DIFFORMIS (Williamson).

Plate 4, fig. 1.

Textularia variabilis WILLIAMSON, var. *difformis* WILLIAMSON, Rec. Foram. Great Britain, 1858, p. 77, pl. 6, figs. 166, 167.

Textularia agglutinans D'ORBIGNY, var. *difformis* PARKER and JONES, in Carpenter, Introd. Foram., 1862, App., p. 311.

Bolivina difformis BALKWILL and WRIGHT, Trans. Roy. Irish Acad., vol. 28, 1885, p. 335.—H. B. BRADY, Journ. Roy. Micr. Soc., 1887, p. 899.—WRIGHT, Ann. Mag. Nat. Hist., ser. 6, vol. 4, 1889, p. 448; Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 474.—Goës, Köngl. Svensk. Vet. Akad. Handl., vol. 25, No. 9, 1894, p. 50.—SIDEBOTTOM, Mem. Proc. Manchester Lit. Philos. Soc., vol. 48, pt. 2, 1904, p. 15.—HERON-ALLEN and EARLAND, Proc. Roy. Irish Acad., vol. 31, pt. 4, 1913, p. 65; Journ. Roy. Micr. Soc., 1916, p. 43; Trans. Linn. Soc. Zool., ser. 2, vol. 11, 1916, p. 239.

Description.—Test much compressed, tapering from the subacute apical end to the apertural end, broadly angular, periphery spinose, especially the later portion; chambers distinct, the outer end of each extended into a short rounded spine; sutures distinct, very slightly depressed, wall smooth, finely punctate; aperture rounded, elongate. Length 0.25–0.40 mm.

Distribution.—This species, as the records show, is very abundant in the region of the British Isles. Except for the record of Sidebottom from the Mediterranean, it is not recorded in any other region. I have had specimens from the "*Lord Bandon*," from off Bantry Bay, southwest of Ireland, in 37½ fathoms (70 meters), in material kindly sent me by Mr. Joseph Wright. Specimens vary little in their general character. This species was well figured by Williamson. It has not occurred in any of the material I have seen from the western Atlantic.

BOLIVINA DILATATA Reuss.

Bolivina dilatata Reuss, Denkschr. Akad. Wiss. Wien, vol. 1, 1850, p. 381, pl. 48, fig. 15.—Terrigi, Atti Accad. Pont. Nuovi Lincei, vol. 33, 1880, p. 197, pl. 2, fig. 42.—Balkwill and Wright, Proc. Roy. Irish Acad., ser. 2, vol. 3, 1882, p. 447.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 418, pl. 52, figs. 20, 21.—Balkwill and Wright, Trans. Roy. Irish Acad., vol. 28, 1885, p. 335.—Woodward, Journ. New York Micr. Soc., 1885, p. 150.—H. B. Brady, Journ. Roy. Micr. Soc., 1887, p. 900.—Malagoli, Boll. Soc. Geol. Ital., ser. 4, vol. 6, 1887, p. 520, pl. 13, fig. 3.—H. B. Brady, Parker, and Jones, Trans. Zool. Soc. London, vol. 12, 1888, p. 221, pl. 43, figs. 3, 6.—Wright, Ann. Mag. Nat. Hist., ser. 6, vol. 4, 1889, p. 448; Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 475.—Terrigi, Mem. Com. Geol. d'Ital., vol. 4, 1891, p. 75, pl. 1, fig. 29.—Robertson, Trans. Nat. Hist. Soc. Glasgow, vol. 3, pt. 3, 1892, p. 240.—Woodward and Thomas, Geol. Nat. Hist. Surv. Minnesota, vol. 3, 1893, p. 33, pl. c, fig. 26.—Egger, Abh. kön. bay. Akad. Wiss. München, Cl. II, vol. 18, 1893, p. 294, pl. 8, figs. 17–20.—Goës, Köngl. Svensk. Vet. Akad. Handl., vol. 25, No. 9, 1894, p. 50, pl. 9, figs. 482–486, pl. 14, figs. 5–10.—Egger, Jahr. 16, naturhist. Ver. Passau, 1895, p. 10, pl. 1, fig. 6.—Millett, Journ. Roy. Micr. Soc., 1900, p. 542.—Fornasini, Mem. Acad. Sci. Bologna, ser. 5, vol. 9, 1901, p. 160.—Chapman, Journ. Linn. Soc. Zool., vol. 28, 1902, p. 400; California Acad. Sci., ser. 3, vol. 1, 1904, p. 244, pl. 29, fig. 6.—Earland, Journ. Quekett Micr. Club, ser. 2, vol. 9, 1905, p. 208.—Heron-Allen and Earland, Journ. Roy. Micr. Soc., 1908, p. 334.—Sidebottom, Mem. Proc. Manchester Lit. Philos. Soc., vol. 54, pt. 3, 1910, p. 13.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 2, 1911, p. 33, fig. 54*a*, *b* (in text).—Bagg, Bull. 513, U. S. Geol. Survey, 1912, p. 40, pl. 11, figs. 7–9.—Heron-Allen and Earland, Journ. Roy. Micr. Soc., 1916, p. 43; Trans. Linn. Soc. Zool., ser. 2, vol. 11, 1916, p. 238.—Cushman, Proc. U. S. Nat. Mus., vol. 56, 1919, p. 603; Bull, 100, U. S. Nat. Mus., vol. 4, 1921, p. 128, pl. 26, fig. 6.

Description.—Test cuneate, broadening rapidly toward the apertural end, the apical end small, blunt, much compressed, the edges thin; chambers numerous, broad, and low, little inflated; sutures very distinct but hardly depressed; wall smooth, punctate; aperture elongate, narrow, ending at the edge of the inner border of the chamber; color white.

Length 0.3–0.6 mm.

Distribution.—From the above references it will be seen that this name has been used by many authors for both recent and fossil specimens from about all the regions from which foraminifera have been obtained. It has been used for all the flat, broad forms of the genus. A comparison, however, of such specimens from different regions shows that there are undoubtedly constant differences which should be more carefully noted. The material from the western Atlantic which is here described as *B. goësii* is one of this group, but no typical *B. dilatata* occurs in that region so far as I have seen. The specimens I have seen from European localities are as a rule very close to the form described by Williamson as *T. variabilis*, var. *spathulata*,[13] which is more elongate and has the chambers curved backward more than found in the type figure of Reuss. Such specimens are evidently very abundant about the British Isles, but so far as I have seen certainly do not occur on our side of the Atlantic.

BOLIVINA DURRANDII Millett.

Bolivina durrandii MILLETT, Journ. Roy. Micr. Soc., 1900, p. 544, pl. 4, fig. 7.—HERON-ALLEN and EARLAND, Journ. Roy. Micr. Soc., 1908, p. 314.

Outside of the Malay Archipelago, from which this species was described by Millett, where he found it in abundance, the only other record seems to be that of Heron-Allen and Earland, who record "one large, very fine specimen of unquestionably recent origin." This was from the shore sands of Sussex, England. This is a very peculiar distribution.

BOLIVINA GLUTINATA Egger.

Bolivina glutinata EGGER, Abh. kön. bay. Akad. Wiss. München, Cl. II, vol. 18, 1893, p. 297, pl. 8, figs. 57–62.

Egger describes this species from *Gazelle* Station 17, off western Africa, in 677 meters (369 fathoms). His figures, as usual, are very poor and give little guide as to the real character of this species.

BOLIVINA GOËSII, new species.

Plate 6, fig. 5.

Bulimina (*Bolivina*) *punctata* D'ORBIGNY, var., GÖES, Köngl. Svensk. Vet. Akad. Handl.. vol. 29, pt. 4, 1882, pl. 4, figs. 124–26.

Bolivina dilatata GOES (part) (not Reuss), Bull. Mus. Comp. Zoöl., vol. 29, 1896, p. 47.

Description.—Test rhomboid, tapering toward the initial end to a blunt point, the apertural end also angular, much compressed, periphery slightly if at all lobulated; chambers fairly numerous, distinct, narrow, at the inner end usually with a ventral pointing projection, somewhat rounded; sutures distinct, very slightly depressed, irregular on account of the peculiar shape of the inner end of the chambers, wall smooth, finely punctate, aperture narrow, slightly elongate; color white.

Length 0.30–0.40 mm.

Distribution.—Type-specimen (U.S.N.M. No. 17092) from *Albatross* station D2641, in 60 fathoms (110 meters), off the coast of

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[13] Rec. Foram. Great Britain, 1858, p. 76, pl. 6, figs. 164, 165.

Florida. The other records for this species are in this same general region, the Bahamas, and off the northeast coast of Brazil. This is evidently the species referred to by Göes in the reference above, but the species differs from *B. dilatata* in the smaller size, shorter form, and the peculiar configuration of the outline of the chambers. It is evidently, from the records, a species of the general West Indian region.

Bolivina goesii—material examined.

Cat. No.	Coll of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F		
17089	U.S.N.M.	1	D2420...	37 03 20 N.; 74 31 40 W..	104	47.7	bk.s.m.g...	Rare.
17090	U.S.N.M.	2	D2629...	23 48 40 N.; 75 10 40 W..	1,169	38.4	co. s.........	Rare.
17091	U.S.N.M.	5	D2639...	25 04 50 N.; 80 15 10 W..	56	....	co. s.........	Few.
17092	U.S.N.M.	4	D2641...	25 11 30 N.; 80 10 00 W..	60	69.2	co. s.........	Few.
17093	U.S.N.M.	1	D2756...	3 22 00 S.; 37 49 00 W..	417	40.5	gy. spk......	Rare.
17094	U.S.N.M.	1	....	Off Fowey Rocks, Fla., S. by E. ½ E.	70	....	....	Rare.
17095	U.S.N.M.	5	....	Ragged Key, Fla.........	75	....	....	Few.
17096	U.S.N.M.	1	....	Key West, Fla...........	78	....	....	Rare.

BOLIVINA GRAMEN (d'Orbigny).

Vulvulina gramen D'ORBIGNY, in De la Sagra, Hist. Fis. Pol. Nat. Cuba, 1839, "Foraminifères," p. 148, pl. 1, figs. 30, 31; Foram. Foss. Bass. Tert. Vienne, 1846, p. 251, pl. 21, figs. 46, 47.—W. B. CARPENTER, PARKER, and JONES, Introd. Foram., 1862, p. 190, pl. 12, fig. 15.

Bolivina gramen HERON-ALLEN and EARLAND, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 69, pl. 5, figs. 4, 5; Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 239.

Heron-Allen and Earland record this species from the Clare Island region and from the western coast of Scotland. It was originally described by d'Orbigny from the coast of Cuba, and there are no further recent records except these. As noted by Heron-Allen and Earland, the specimens from the British Isles are not entirely typical.

BOLIVINA INFLATA Heron-Allen and Earland.

Plate 9, figs. 1–4.

Bolivina inflata HERON-ALLEN and EARLAND, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 68, pl. 4, figs. 16–19; Journ. Roy. Micr. Soc., 1916, p. 43; Trans. Linn. Soc. Zool., ser. 2, vol. 11, 1916, p. 240.

Description.—"Test wedge-shaped, consisting of five to nine pairs of chambers rapidly increasing in breadth and thickness, so that the terminal portion of the shell is comparatively inflated. Marginal edges, rounded, sutures slightly depressed. Aperture somewhat variable, at times regularly textularian, but usually bolivine, situate at the extremity of the terminal chamber. Surface hyaline, coarsely punctate, somewhat rough. Average breadth, 0.12–0.15 mm. Average length, 0.17–0.25 mm. Average thickness of oral extremity, 0.1 mm."

Distribution.—This species described from the Clare Island region is also recorded by the authors from off South Cornwall and from nine stations west of Scotland, although they remark as follows on this last material: "Poorly represented, the specimens being few, and not very typical." I have seen no specimens in the western Atlantic which can be referred to this.

BOLIVINA LAEVIGATA (Williamson).

Plate 4, fig. 2.

Textularia variabilis Williamson, var. *laevigata* Williamson, Rec. Foram. Great Britain, 1858, p. 77, pl. 6, fig. 168.

Textularia agglutinans d'Orbigny, var. *variabilis* Parker and Jones, in Carpenter, Introd. Foram., 1862, p. 312.

Bolivina laevigata H. B. Brady, Journ. Roy. Micr. Soc., 1887, p. 900.—Wright, Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 474.—Earland, Journ. Quekett Micr. Club, ser. 2, vol. 9, 1905, p. 208.—Heron-Allen and Earland, Journ. Roy. Micr. Soc., 1908, p. 335; Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 65; Journ. Roy. Micr. Soc., 1915, p. 43; Trans. Linn. Soc. Zool., ser. 2, vol. 11, 1916, p. 238.

As will be seen by the above references, *B. laevigata* has been recorded from various places off the British Isles. As far as I have seen the species does not occur in the western Atlantic.

BOLIVINA (BIFARINA) LIMBATA H. B. Brady.

Plate 7, fig. 3.

Bolivina limbata H. B. Brady, Quart. Journ. Micr. Sci., vol. 21, 1881, p. 57; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 419, pl. 52, figs. 26–28.—Howchin, Trans. Roy. Soc. South Australia, vol. 12, 1889, p. 8.—Egger, Abh. kön. bay. Akad. Wiss. München, Cl. II, vol. 18, 1893, p. 300, pl. 8, figs. 10–12.—Chapman, Journ. Linn. Soc. Zool., vol. 28, 1900, p. 187.—Millett, Journ. Roy. Micr. Soc., 1900, p. 543.—Chapman, Journ. Linn. Soc. Zool., vol. 28, 1902, p. 382.—Sidebottom, Mem. Proc. Manchester Lit. Philos. Soc., vol. 49, No. 5, 1905, p. 15.—Dakin, Rep. Ceylon Pearl-Oyster Fish., vol. 5, 1906, p. 234.—Chapman, Journ. Linn. Soc. Zool., vol. 30, 1907, p. 32, pl. 4, fig. 83.—Bagg, Proc. U. S. Nat. Mus., vol. 34, 1908, p. 138.—Sidebottom, Mem. Proc. Manchester Lit. Philos. Soc., vol. 54, pt. 3, 1910, p. 13.—Chapman, Journ. Linn. Soc. Zool., vol. 30, 1910, p. 404.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 2, 1911, p. 47, figs. 78*a–c* (in text).—Heron-Allen and Earland, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 67, pl. 5, figs. 2, 3.—Cushman, Publ. 291, Carnegie Inst. Wash., 1919, p. 33; Bull. 100, U. S. Nat. Mus., vol. 4, 1921, p. 135, pl. 19, fig. 5.

Description.—Test elongate, much compressed, gradually tapering to the rather bluntly rounded apical end, often somewhat twisted, thickest along the median line, thinning toward the lateral margins, which are slightly rounded; chambers usually about as high as wide, slightly tumid, the sutures very distinct, irregularly curved, limbate; especially along the median portion of the face; wall calcareous, smooth, punctate; aperture elongate-oval, in some specimens somewhat remote from the border and terminal; color white.

Length 0.50–0.75 mm.

BOLIVINA PLICATA d'Orbigny.

Bolivina plicata D'ORBIGNY, Voy. Amér. Mérid., vol. 5, pt. 5, 1839, "Foraminifères," p. 62, pl. 8, figs. 4-7.—H. B. BRADY, Ann. Mag. Nat. Hist., ser. 4, vol. 6, 1870, p. 302, pl. 12, figs. 7*a*, *b*.—MOEBIUS, Beitr. Meeresfauna, Insel Mauritius, 1880, p. 95, pl. 9, figs. 12, 13.—BALKWILL and WRIGHT, Proc. Roy. Irish Acad., ser. 2, vol. 3, 1882, p. 447; Trans. Roy. Irish Acad., vol. 28, 1885, p. 335.—H. B. BRADY, Journ. Roy. Micr. Soc., 1887, p. 889.—H. B. BRADY, PARKER, and JONES, Trans. Zool. Soc. London, vol. 12, 1888, p. 221.—HALKYARD, Trans. Ann. Rep. Manchester Micr. Soc., 1889, p. 65, pl. 1, fig. 13.—WRIGHT, Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 474.—ROBERTSON, Trans. Nat. Hist. Soc. Glasgow, vol. 3, pt. 3, 1892, p. 240.—GOËS, Köngl. Svensk. Vet. Akad. Handl., vol. 25, no. 9, 1894, p. 51, pl. 9, figs. 487, 488.—MILLETT, Journ. Roy. Micr. Soc., 1900, p. 545.—CUSHMAN, Amer. Geologist, vol. 33, 1904, p. 265.—EARLAND, Journ. Quekett Micr. Club, ser. 2, vol. 9, 1905, p. 209.—BAGG, Proc. U. S. Nat. Mus., vol. 34, 1908, p. 138.—HERON-ALLEN and EARLAND, Journ. Roy. Micr. Soc., 1908, p. 335.—SIDEBOTTOM, Mem. Proc. Manchester Lit. Philos. Soc., vol. 54, pt. 3, 1910, p. 13.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 2, 1911, p. 43.—HERON-ALLEN and EARLAND, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 68; Journ. Roy. Micr. Soc., 1916, p. 43; Trans. Linn. Soc. Zool., ser. 2, vol. 11, 1916, p. 240.—SIDEBOTTOM, Journ. Roy. Micr. Soc., 1918, p. 127.

This species is recorded at numerous stations off the British Isles, off the coast of Norway, off the Abrohlos Bank, Brazil, and elsewhere in other oceans. The comparison of the original figure given by d'Orbigny, whose specimens were from off the coast of Chile, with those referred to this name, such as that given by Goës in the above referred, show what very great differences there are in these forms referred to this species. Heron-Allen and Earland (1913, p. 68) give two references above referred to as figured specimens, the original of d'Orbigny, and that of Goës, and it is very difficult with such a basis to determine what form occurs in any definite region until the specimens themselves are studied and figured. Nothing has been noted in the western Atlantic material which I could refer to this species.

BOLIVINA (BIFARINA) PORRECTA H. B. Brady.

Plate 7, fig. 2.

Bolivina porrecta H. B. BRADY, Quart. Journ. Micr. Sci., vol. 21, 1881, p. 57; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 418, pl. 52, figs. 22*a–c*.—FLINT, Rep. U. S. Nat. Mus., 1897 (1899), p. 292, pl. 38, fig. 2.

Description.—Test elongate, slightly tapering, apical end bluntly rounded, apertural end obliquely truncate, compressed; chambers numerous, broadest near the middle, somewhat inflated, the later ones extending clear across the test; sutures distinct, depressed, wall thin and translucent, very finely perforate, smooth; aperture elongate, elliptical, terminal, in a slight lip.

Length 1 mm. or slightly more.

Distribution.—One of the original localities for this species was a *Challenger* station off Culebra Island, West Indies, in 390 fathoms

(713 meters). Pearcey records this from the warm area of Faroe Channel as rare.[15] Flint gives a single station *Albatross* D2530, in 956 fathoms (1749 meters), southeast of Georges Bank. There are two other *Challenger* stations in the Atlantic, one off the Bermudas. the other off the Azores. The six stations from which I have had specimens are scattered, one southeast of Cape Hatteras, one off Ragged Key, Florida, three in various parts of the Caribbean, and one off the coast of Brazil. The Atlantic specimens are very long, slender, and are very finely punctate, differing from the somewhat broader, very coarsely punctate form of the Pacific.

Bolivina porrecta—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
17135	U.S.N.M.	1	D2140...	17 36 10 N.; 76 46 05 W..	966	39.7	s............	Rare.
17136	U.S.N.M.	2	D2150...	13 34 45 N.; 81 21 10 W..	382	45.8	wh. crs. s...	Rare.
17137	U.S.N.M.	8	D2614...	34 09 00 N.; 76 02 00 W..	168	....	gy. s. bk. sp..	Common.
17138	U.S.N.M.	1	D2751...	16 54 00 N.; 63 12 00 W..	687	40.0	bu. glob. oz..	Rare.
17139	U.S.N.M.	1	D2756...	3 22 00 S.; 37 49 00 W..	417	40.5	gy. sp.......	Rare.
17140	U.S.N.M.	1	....	Ragged Key. Fla.........	75	....	....	Rare.

BOLIVINA MAYORI Cushman.

Bolivina mayori CUSHMAN, Publ. 311, Carnegie Inst. Wash., 1922, p. 27, pl. 3, figs. 5, 6.

Description.—Test elongate, somewhat compressed, of nearly uniform width, except in the extreme young; chambers numerous, distinct; sutures depressed; wall thin, translucent, coarsely punctate, especially in the young; chambers in the later portion extending clear across the test, the last-formed chamber in the adults forming the entire width of the test and usually of a less diameter than the preceding; the wall smooth, except in the early portion, which has a few longitudinal costae; aperture in the adult terminal, elongate, extending nearly across the peripheral end of the last-formed chamber with a slightly projecting lip.

Length up to 0.85 mm.

This species most nearly resembles *B. porrecta* H. B. Brady, bu differs in the more attenuate form and the ornamentation of th early portion. The punctations over a large part of the surface ar arranged in longitudinal lines. In old-age specimens the diameter the test is considerably less in the last-formed chamber than at th maximum width of the preceding chambers. The aperture wou place this species in the subgenus *Bifarina*. It has occured numerous stations in the Tortugas region, but not in any conside able numbers.

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[15] Trans. Nat. Hist. Soc. Glasgow, vol. 2, 1890, p. 177.

These specimens resemble very much Brady's figure in the *Challenger* Report (pl. 53, fig. 14), which he refers to *Bolivina nobilis* Hantken. A comparison of these with Hantken's original figures shows that the two are probably different species. Brady's specimens were all from the South Pacific, and our specimens from the Tortugas are probably identical or very closely related to those of the South Pacific.

BOLIVINA PULCHELLA (d'Orbigny).

Plate 7, fig. 4.

Sagrina pulchella d'Orbigny, in De la Sagra, Hist. Fis. Pol. Nat. Cuba, 1839, "Foraminifères," p. 150, pl. 1, figs. 23, 24.

Bolivina costata Goës (not d'Orbigny), Svensk. Vet. Akad. Handl., vol. 19, no. 4, 1882, p. 71, pl. 4, figs. 129–132.

Bolivina caribaea Goës (not d'Orbigny), Bull. Mus. Comp. Zoöl., vol. 29, 1896, p. 48.

Bolivina pulchella Cushman, Publ. 311, Carnegie Inst. Wash., 1922, p. 25, pl. 1, figs. 8, 9.

Description.—Test small, about one and one-half times as long as wide; chambers comparatively few, increasing rapidly in size as added, initial end subacute, apertural end broad and rounded, chambers fairly distinct, ornamented by a series of short, longitudinal costae, the outer angles of the chambers somewhat extended, forming a somewhat toothed edge to the test; sutures indistinct, very slightly depressed, wall thin, translucent, very finely punctate, over the sutures somewhat more opaque; aperture an elongate oval opening.

Length 0.15–0.25 mm.

Distribution.—Typical specimens were obtained from the lagoon of the Dry Tortugas, Florida, southwest of Brilliant Shoal, in 7½ fathoms (13 meters). In addition it has occurred at several *Albatross* stations, all but one in the Caribbean, the exception being off the Carolina coast. This species is a small, but very definite one, both in shape and ornamentation. Goës evidently had this species from the Caribbean, first as *B. costata*, and later under *B. caribaea*. D'Orbigny's specimens were from the shore sands of Cuba.

Bolivina pulchella—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
17123	U.S.N.M.	5	D2150	13 34 45 N.; 81 21 10 W.	382	45.8	wh. crs. s.	Few.
17124	U.S.N.M.	1	D2614	34 09 00 N.; 76 02 00 W.	168		gy. s. bk. sp.	Rare.
17125	U.S.N.M.	8	H59	17 42 10 N.; 65 39 40 W.	789		oz. for.	Common.
17126	U.S.N.M.	1	H79	14 20 30 N.; 63 10 00 W.	821		oo. s. sh. for.	Rare.
17127	U.S.N.M.	1		Tortugas, Fla.	6			Rare.

(713 meters). Pearcey records this from the warm area of Faroe Channel as rare.[15] Flint gives a single station *Albatross* D2530, in 956 fathoms (1749 meters), southeast of Georges Bank. There are two other *Challenger* stations in the Atlantic, one off the Bermudas, the other off the Azores. The six stations from which I have had specimens are scattered, one southeast of Cape Hatteras, one off Ragged Key, Florida, three in various parts of the Caribbean, and one off the coast of Brazil. The Atlantic specimens are very long, slender, and are very finely punctate, differing from the somewhat broader, very coarsely punctate form of the Pacific.

Bolivina porrecta—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
17135	U.S.N.M.	1	D2140...	17 36 10 N.; 76 46 05 W..	966	39.7	s............	Rare.
17136	U.S.N.M.	2	D2150...	13 34 45 N.; 81 21 10 W..	382	45.8	wh. crs. s...	Rare.
17137	U.S.N.M.	8	D2614...	34 09 00 N.; 76 02 00 W..	168	......	gy. s. bk. sp..	Common.
17138	U.S.N.M.	1	D2751...	16 54 00 N.; 63 12 00 W..	687	40.0	bu. glob. oz..	Rare.
17139	U.S.N.M.	1	D2756...	3 22 00 S.; 37 49 00 W..	417	40.5	gy. sp.......	Rare.
17140	U.S.N.M.	1	....	Ragged Key. Fla.........	75	......	....	Rare.

BOLIVINA MAYORI Cushman.

Bolivina mayori CUSHMAN, Publ. 311, Carnegie Inst. Wash., 1922, p. 27, pl. 3, figs. 5, 6.

Description.—Test elongate, somewhat compressed, of nearly uniform width, except in the extreme young; chambers numerous, distinct; sutures depressed; wall thin, translucent, coarsely punctate, especially in the young; chambers in the later portion extending clear across the test, the last-formed chamber in the adults forming the entire width of the test and usually of a less diameter than the preceding; the wall smooth, except in the early portion, which has a few longitudinal costae; aperture in the adult terminal, elongate, extending nearly across the peripheral end of the last-formed chamber with a slightly projecting lip.

Length up to 0.85 mm.

This species most nearly resembles *B. porrecta* H. B. Brady, but differs in the more attenuate form and the ornamentation of the early portion. The punctations over a large part of the surface are arranged in longitudinal lines. In old-age specimens the diameter of the test is considerably less in the last-formed chamber than at the maximum width of the preceding chambers. The aperture would place this species in the subgenus *Bifarina*. It has occured at numerous stations in the Tortugas region, but not in any considerable numbers.

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[15] Trans. Nat. Hist. Soc. Glasgow, vol. 2, 1890, p. 177.

These specimens resemble very much Brady's figure in the *Challenger* Report (pl. 53, fig. 14), which he refers to *Bolivina nobilis* Hantken. A comparison of these with Hantken's original figures shows that the two are probably different species. Brady's specimens were all from the South Pacific, and our specimens from the Tortugas are probably identical or very closely related to those of the South Pacific.

BOLIVINA PULCHELLA (d'Orbigny).

Plate 7, fig. 4.

Sagrina pulchella D'ORBIGNY, in De la Sagra, Hist. Fis. Pol. Nat. Cuba, 1839, "Foraminifères," p. 150, pl. 1, figs. 23, 24.

Bolivina costata Goës (not d'Orbigny), Svensk. Vet. Akad. Handl., vol. 19, no. 4, 1882, p. 71, pl. 4, figs. 129–132.

Bolivina caribaea Goës (not d'Orbigny), Bull. Mus. Comp. Zoöl., vol. 29, 1896, p. 48.

Bolivina pulchella CUSHMAN, Publ. 311, Carnegie Inst. Wash., 1922, p. 25, pl. 1, figs. 8, 9.

Description.—Test small, about one and one-half times as long as wide; chambers comparatively few, increasing rapidly in size as added, initial end subacute, apertural end broad and rounded, chambers fairly distinct, ornamented by a series of short, longitudinal costae, the outer angles of the chambers somewhat extended, forming a somewhat toothed edge to the test; sutures indistinct, very slightly depressed, wall thin, translucent, very finely punctate, over the sutures somewhat more opaque; aperture an elongate oval opening. Length 0.15–0.25 mm.

Distribution.—Typical specimens were obtained from the lagoon of the Dry Tortugas, Florida, southwest of Brilliant Shoal, in 7½ fathoms (13 meters). In addition it has occurred at several *Albatross* stations, all but one in the Caribbean, the exception being off the Carolina coast. This species is a small, but very definite one, both in shape and ornamentation. Goës evidently had this species from the Caribbean, first as *B. costata*, and later under *B. caribaea*. D'Orbigny's specimens were from the shore sands of Cuba.

Bolivina pulchella—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
17123	U.S.N.M.	5	D2150	13 34 45 N.; 81 21 10 W.	382	45.8	wh. crs. s.	Few.
17124	U.S.N.M.	1	D2614	34 09 00 N.; 76 02 00 W.	168	......	gy. s. bk. sp.	Rare.
17125	U.S.N.M.	8	H59	17 42 10 N.; 65 39 40 W.	789	......	oz. for.	Common.
17126	U.S.N.M.	1	H79	14 20 30 N.; 63 10 00 W.	821	......	oo. s. sh. for.	Rare.
17127	U.S.N.M.	1	......	Tortugas, Fla.	6	......	......	Rare.

BOLIVINA PUNCTATA d'Orbigny.

Plate 7, fig. 1.

Bolivina punctata d'Orbigny, Voy. Amér. Mérid., vol. 5, pt. 5, 1839, "Foraminifères," p. 63, pl. 8, figs. 10–12.—H. B. Brady, Trans. Linn. Soc. London, vol. 24, 1864, p. 468, pl. 48, figs. 9*a*, *b*; Nat. Hist. Trans. Northumberland and Durham, vol. 1, 1865–67 (1867), p. 103, pl. 12, figs. 8*a*, *b*.—Mobius, Beitr. Meeresfauna, Insel Mauritius, 1880, p. 94, pl. 9, figs. 9, 10.—Terrigi, Atti Acc. Pont. Nuovi Lincei, vol. 33, 1880, p. 197, pl. 2, fig. 41.—Balkwill and Wright, Proc. Roy. Irish Acad., ser. 2, vol. 3, 1882, p. 447.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 417, pl. 52, figs. 18, 19.—Balkwill and Wright, Trans. Roy. Irish. Acad., ser. 2, vol. 28, 1887, p. 335.—Woodward and Thomas, 13th Ann. Rep. Geol. Nat. Hist. Surv. Minnesota for 1884 (1885), p. 169, pl. 3, fig. 12.—Sherborn and Chapman, Journ. Roy. Micr. Soc., 1886, p. 743, pl. 14, figs. 10*a*, *b*.—H. B. Brady, Journ. Roy. Micr. Soc., 1887, p. 899.—H. B. Brady, Parker, and Jones, Trans. Zool. Soc. London, vol. 12, 1888, p. 221.—Malagoli, Boll. Soc. Geol. Ital., vol. 7, 1889, p. 375, pl. 14, figs. 1–4.—Wright, Ann. Mag. Nat. Hist., ser. 6, vol. 4, 1889, p. 448.—Pearcey, Trans. Nat. Hist. Soc. Glasgow, vol. 2, 1890, p. 177.—Terrigi, Mem. Com. Geol. d'Italia, vol. 4, 1891, p. 74, pl. 1, figs. 26–28.—Wright, Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 474.—Robertson, Trans. Nat. Hist. Soc. Glasgow, vol. 3, pt. 3, 1892, p. 240.—Woodward and Thomas, Geol. Nat. Hist. Surv. Minnesota, vol. 3, 1893, p. 34, pl. *C*, figs. 27, 28.—Egger, Abh. kön. bay. Akad. Wiss. München, Cl. II, vol. 18, 1893, p. 298, pl. 8, figs. 1–3.—Goës, Kongl. Svensk. Vet. Akad. Handl., vol. 25, No. 9, 1894, p. 49, pl. 9, figs. 475–478, 480.—Chapman, Proc. Zool. Soc. London, 1895, p. 23.—Egger, Jahr. 16, naturhist. Ver. Passau, 1895, p. 12, pl. 1, fig. 11.—Goës, Bull. Mus. Comp. Zoöl., vol. 29, 1896, p. 47.—Morton, Proc. Portland Soc. Nat. Hist., 1897, p. 115, pl. 1, fig. 11.—Flint, Rep. U. S. Nat. Mus., 1897 (1899), p. 292, pl. 38, fig. 1.—Chapman, Journ. Linn. Soc. Zool., vol. 28, 1900, p. 186.—Wright, Geol. Mag., Dec. 4, vol. 7, 1900, p. 100, pl. 5, fig. 10.—Millett, Journ. Roy. Micr. Soc. 1900, p. 540.—Whiteaves, Geol. Survey Canada, 1901, p. 10.—Chapman, Journ. Linn. Soc. Zool., vol. 28, 1902, p. 400.—Earland, Journ. Quekett Micr. Club, ser. 2, vol. 9, 1905, p. 208.—Sidebottom, Mem. Proc. Manchester Lit. Philos. Soc., vol. 49, No. 5, 1905, p. 14.—Dakin, Rep. Ceylon Pearl-Oyster Fish., vol. 5, 1906, p. 234.—Chapman, Journ. Linn. Soc. Zoology, vol. 30, 1907, p. 32, pl. 4, fig. 80; Journ. Quekett Micr. Club, 1907, p. 128.—Bagg, Proc. U. S. Nat. Mus., vol. 34, 1908, p. 138.—Cushman, Proc. Boston Soc. Nat. Hist., vol. 34, 1908, p. 28, pl. 5, fig. 13.—Heron-Allen and Earland, Journ. Roy. Micr. Soc., 1908, p. 336.—Chapman, Proc. Roy. Soc. Victoria, vol. 22, 1910, p. 274; Journ. Linn. Soc. Zool., vol. 30, 1910, p. 404.—Sidebottom, Mem. Proc. Manchester Lit. Philos. Soc., vol. 54, pt. 3, 1910, p. 13.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 2, 1911, p. 32, figs. 53*a*, *b* (in text).—Bagg, Bull. 513, U. S. Geol. Surv., 1912, p. 41, pl. 10, figs. 1–5.—Heron-Allen and Earland, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 64.—Pearcey, Trans. Roy. Soc. Edinburgh, vol. 49, 1914, p. 1013.—Chapman, Biol. Res. *Endeavour*, vol. 3, pt. 1, 1915, p. 20.—Heron-Allen, and Earland, Journ. Roy. Micr. Soc., 1916, p. 43; Trans. Linn. Soc. Zool., ser. 2, vol. 11, 1916, p. 237.—Mestayer, Trans. New Zealand Inst., vol. 28, 1916, p. 129.—Sidebottom, Journ. Roy. Micr. Soc. 1918, p. 126.—Cushman, Bull. 676, U. S. Geol. Survey, 1918, p. 49; Publ. 291, Carnegie Inst. Wash., 1919, p. 33.; Proc. U. S. Nat. Mus., vol. 59, 1921, p. 51, pl. 11, figs. 9, 10; Bull. 100, U. S. Nat. Mus., vol. 4, 1921, p. 136, pl. 26, fig. 5.

Bulimina presli Reuss, var. (*Bolivina*) *punctata*, Parker and Jones, Philos. Trans., vol. 155, 1865, p. 376, pl. 17, fig. 74.

Description.—Test much elongate, straight or slightly curved, the apical end bluntly pointed, tapering very gradually to the apertural end; chambers numerous, somewhat compressed, the sutures slightly depressed, the chambers increasing in height as added; wall smooth, conspicuously but finely punctate; aperture an elongated slit, widest at the inner end; color white, brownish when living.

Length 0.40–0.85 mm.

Distribution.—This species, if one believes the figures referred to it, is very variable and is very widely distributed. It seems to be one of those species to which almost any elongate, slightly compressed, smooth form of *Bolivina* is referred.

In the western Atlantic material forms which can be definitely referred to d'Orbigny's species are comparatively rare. They are found at a few stations on the southeast coast of the United States south of Cape Hatteras, in the Gulf of Mexico, and the Caribbean. Brady gives a number of stations well scattered from off Bermuda, off the West Indies, off the Azores, off Brazil, and in deeper water in the mid-Atlantic. There are numerous records of its occurrence in European waters.

Bolivina punctata—*material examined.*

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
17084	U.S.N.M.	3	D2150...	13 34 45 N.; 81 21 10 W...	382	45.8	wh. crs. s...	Few.
17085	U.S.N.M.	1	D2396...	28 34 00 N.; 86 48 00 W...	335	....	gy. m.......	Rare.
17086	U.S.N.M.	2	D2614...	34 09 00 N.; 76 02 00 W...	168	....	gy.s. bk. sp	Rare.
17087	U.S.N.M.	1	D2679...	32 40 00 N.; 76 40 30 W...	782	38.6	lt. gy. oz....	Rare.
17088	U.S.N.M.	1	H60.....	17 39 00 N.; 65 44 00 W...	578	....	co. s. for....	Rare.

BOLIVINA STRIATULA Cushman.

Bolivina striatula Cushman, Publ. 311, Carnegie Inst. Wash., 1922, p. 27, pl. 3, fig. 10.

Description.—Test elongate, gradually tapering from the somewhat rounded initial end to the broad apertural end; chambers numerous, distinct, slightly inflated; sutures very slightly depressed; early portion of the test less compressed than the adult, the peripheral margin rounded in the young, sharply angled in the adult, early portion of the test with numerous longitudinal striations occupying about half the length of the test, following the chambers with a very fine reticulate pattern, the final chambers being smooth, hardly punctate.

Length 0.35 mm.

This species is peculiar in the three different stages of ornamentation and the development of the test. The early portion is more or less rounded, with numerous fine longitudinal costae, followed by a few more compressed chambers, the surface of which has a very fine reticulate pattern, not seeming to be raised from the surface of the test and yet distinct with a considerable magnification. The last-formed chambers are still more compressed, with a sharp edge, and are composed of clear, transparent shell material, the wall being not even punctate over a large part of the surface.

BOLIVINA RHOMBOIDALIS (Millett).

Textularia rhomboidalis MILLETT, Journ. Roy. Micr. Soc., 1899, p. 559, pl. 7, fig. 4.—SIDEBOTTOM, Mem. Proc. Manchester Lit. Philos. Soc., vol. 49, 1905, no. 5, p. 8, pl. 2, fig. 2.

Bolivina rhomboidalis CUSHMAN, Publ. 311, Carnegie Inst. Wash., 1922, p. 28.

Description.—Test generally triangular in front view, increasing in breadth from the rather bluntly pointed initial end to the broad apertural end, which is oblique; chambers numerous, distinct, obliquely placed, so that the test in end view, instead of having the sides at right angles to one another, has them more or less oblique, giving a rhomboid shape to the test in end view; wall translucent, coarsely punctate; aperture a low slit at the base of the inner margin of the last-formed chamber within a reentrant of the margin; color white.

Length of the Tortugas specimens 0.40 mm.

Distribution.—This is from station 28, in Bird Key Harbor, Tortugas, in 4.75 fathoms (9 meters). This species was described by Millett under the genus *Textularia* from the Malay Archipelago, and he gives also *Challenger* station 185, off Raine Island, and other localities in Torres Strait, and also the Aegean Sea. Sidebottom's specimens were from the Mediterranean. This single Tortugas specimen is very similar to that figured by Millett. It has not previously been recorded from the Atlantic, but should be looked for further in the West Indian region.

BOLIVINA QUADRILATERA (Schwager).

Plate 8, fig. 2.

Textularia quadrilatera SCHWAGER, *Novara*-Exped., Geol. Theil, vol. 2, 1866, p. 253, pl. 7, fig. 10.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 358, pl. 42, figs. 8–12.—FLINT, Rep. U. S. Nat. Mus., 1897 (1899), p. 283, pl. 28, fig. 3.—MILLETT, Journ. Roy. Micr. Soc., 1899, p. 559, pl. 7, fig. 3.—BAGG, Proc. U. S. Nat. Mus., vol. 34, 1908, p. 131.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 2, 1911, p. 24, figs. 42–44 (in text).

Bolivina quadrilatera WRIGHT, Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 475.

Description.—Test elongate, slender, very slightly tapering, in end view quadrilateral, the angles usually carinate; chambers high and narrow, running back obliquely on the outer border, compressed; the initial end of the test often with a stout spine, occasionally with several small spines or smooth and broadly rounded, the early chambers sometimes with one or more longitudinal raised costae for a short distance; wall hyaline, distinctly perforate; aperture at one side near the distal end of the chamber, sometimes obliquely elongate, but somewhat variable.

Length up to 1.2 mm., megalospheric proloculum 0.076–0.115 mm., microspheric proloculum 0.012–0.023 mm.

Distribution.—Most of the records for this species are from the Pacific, where it is very characteristic of considerable depths in tropical and subtropical waters. In the Atlantic it is recorded by Brady from the *Challenger* stations off the Canaries, off the Cape Verde Islands, and southeast of Pernambuco, Brazil. Flint recorded this species from *Albatross* station D2144 in 896 fathoms (1,639 meters), near Aspinwall, Isthmus of Panama. I have found this species fairly common at this same station in the material I have examined, but it has not occurred elsewhere in the western Atlantic material. These specimens are all without the basal spine which is so characteristic of most Pacific specimens that I have seen. Wright has recorded this species from off the southwest coast of Ireland, but it has not been recorded in this region by other workers. From its general character of the test and the aperture, it seems as though this species should belong to *Bolivina* rather than to *Textularia*.

Bolivina quadrilatera—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F		
17099	U.S.N.M.	3	D2144...	9 49 00 N.; 79 31 30 W..	896	....	gn. m.......	Rare.
17100	U.S.N.M.	2	D2641...	25 11 30 N.; 80 10 00 W..	60	69.2	co. s.........	Rare.

BOLIVINA COMPACTA Sidebottom.

Bolivina robusta H. B. Brady, var. *compacta* Sidebottom, Mem. Proc. Manchester Lit. Philos. Soc., vol. 49, No. 5, 1905, p. 15, pl. 3, fig. 7.

Bolivina compacta Cushman, Bull. 71, U. S. Nat. Mus., pt. 2, 1911, p. 36, fig. 58 (in text); Publ. 311, Carnegie Inst. Wash., 1922, p. 26, pl. 1, fig. 10.

Description.—Test elongate, tapering, periphery rounded, initial end bluntly pointed, apertural end obliquely rounded; chambers numerous, somewhat inflated; sutures very slightly depressed, not very distinct; wall ornamented by a series of large coarse punctae, somewhat irregularly arranged, those of the last-formed chambers finer and more numerous; aperture elongate, extending from the base of the inner margin of the last-formed chamber to the highest point of the chamber; color white.

Length of the Tortugas specimens 0.5 mm.

Distribution.—Specimens of this species are extremely rare, a single typical specimen occurring at station 20 in 7 fathoms and another less typical specimen from station 22 in 6 fathoms, in the Tortugas region. Sidebottom originally described this as a variety of *Bolivina robusta* from the Mediterranean, and I have referred to it specimens from the tropical Pacific.

BOLIVINA ROBUSTA H. B. Brady, variety.

Plate 6, fig. 6.

There are specimens from two *Albatross* stations, D2150, in the western Caribbean, and D2420, off the southeast coast of the United States. These may be referred to this species. They are somewhat like the figures given by Brady (pl. 53, fig. 7), but lack the spine typical of this species. There are *Challenger* records for this species from off the West Indies in 450 fathoms (823 meters), off Bermuda, 950 fathoms (1,740 meters), off the Canaries, 1,125 fathoms (2,057 meters), and off the coast of Brazil, 675 fathoms (1,234 meters).

Bolivina robusta, var.—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
17078	U.S.N.M.	1	D2150...	13 34 45 N.; 81 21 10 W..	382	45.8	wh. crs. s....	Rare.
17079	U.S.N.M.	4	D2420...	42 41 00 N.; 64 55 30 W..	62	40.6	rky..........	Few.

BOLIVINA SUBAENARIENSIS, new species.

Plate 7, fig. 6.

Bolivina aenariensis H. B. Brady (not Costa), Proc. Roy. Soc. Edinburgh, vol. 11, 1882, p. 711; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 423, pl. 53, figs. 10, 11; Journ. Roy. Micr. Soc., 1887, p. 900.—H. B. Brady, Parker, and Jones, Trans. Zool. Soc. London, vol. 12, 1888, p. 221, pl. 43, figs. 2, 4, 5.—Pearcey, Trans. Nat. Hist. Soc. Glasgow, vol. 2, 1890, p. 177.—Wright, Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 475.—Flint, Rep. U. S. Nat. Mus., 1897 (1899), p. 292, pl. 37, fig. 8.

Description.—Test elongate, much compressed, slightly tapering, periphery acute, often carinate, surface smooth except for two long raised costae running from the apex toward the apertural end of the test, and one or two supplementary ones, much shorter, the apical end with a single short spine; chambers distinct, curved, widest near the center; sutures distinct, slightly depressed, wall finely punctate; aperture semicircular; color white.

Length up to, or slightly exceeding, 1 mm.

Distribution.—Type-specimen (U.S.N.M. No. 17113) from *Albatross* station D2262, in 250 fathoms (457 meters), southeast of Nantucket. It is a common species at many stations from south of Nova Scotia to Cape Hatteras. It is apparently found off the British Isles in cold water and is excellently figured by Brady, Parker, and Jones from the Abrohlos Bank, Brazil, in 40 and 260 fathoms (73 and 476 meters). Specimens referred to *B. aenariensis* by Heron-Allen and Earland from off the coast of England may be this species, but their figured specimen at least from the Clare Island region is not at all like this. The species is replaced south of Cape Hatteras and in the Gulf of Mexico by the following variety.

Bolivina subaenariensis—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
17106	U.S.N.M.	4	D2003...	37 16 30 N.; 74 20 36 W..	641	....	....	Few.
17107	U.S.N.M.	3	D2048...	40 02 00 N.; 68 50 30 W..	547	29.0	crs. s. m. g..	Few.
17108	U.S.N.M.	3	D2078...	41 11 30 N.; 66 12 20 W..	499	40.0	gy. m. s.....	Few.
17109	U.S.N.M.	1	D2064...	40 16 50 N.; 67 05 15 W..	1,290	40.0	bu. m. s.....	Rare.
17110	U.S.N.M.	1	D2111...	35 09 50 N.; 74 57 40 W..	938	....	gn. m.......	Rare.
17111	U.S.N.M.	1	D2242...	40 15 30 N.; 70 27 00 W..	58	51.4	gn. m.......	Rare.
17112	U.S.N.M.	1	D2247...	40 03 00 N.; 69 57 00 W..	67	52.4	gn.m.bk.sp.	Rare.
17113	U.S.N.M.	10	D2262...	39 54 45 N.; 69 29 45 W..	250	41.6	gn. m. s.....	Common.
17114	U.S.N.M.	1	D2263...	37 08 00 N.; 74 33 00 W..	430	....	gn. m.......	Rare.
17115	U.S.N.M.	1	D2425...	36 20 24 N.; 76 46 30 W..	119	51.5	dk. gy. m. fne. s.	Rare.
17116	U.S.N.M.	1	D2539...	39 59 45 N.; 70 53 00 W..	133	47.7	gn. s........	Rare.
17118	U.S.N.M.	7	D2542...	40 00 15 N.; 70 42 20 W..	129	47.2	s. brk. sh....	Common.
17119	U.S.N.M.	2	D2544...	40 01 45 N.; 70 24 00 W..	131	47.7	gn. s. bk. sp.	Rare.
17117	U.S.N.M.	5	D2550...	39 44 30 N.; 70 30 45 W..	1,081	38.5	br. m.......	Few.
17120	U.S.N.M.	10	D2555...	39 53 00 N.; 71 32 00 W..	136	47.7	gn. m. s.....	Common.
17121	U.S.N.M.	1	D2572...	40 29 00 N.; 66 04 00 W..	1,769	37.8	gy. oz.......	Rare.
17122	U.S.N.M.	1	D2677...	32 39 00 N.; 76 50 30 W..	478	39.3	gn. m.......	Rare.

BOLIVINA SUBAENARIENSIS, new species, var. MEXICANA, new variety.

Plate 8, fig. 1.

Bolivina aenariensis FLINT (part) (not Costa), Rep. U. S. Nat. Mus., 1897 (1899), p. 292.

Description.—Variety differing from the typical in the greater number of costae which for the most part run nearly to the apertural end of the test; by the sharper, more abruptly tapering form, especially toward the apex of the test, and by the translucent character of the wall.

Distribution.—Type-specimen (U.S.N.M. No. 17129) from *Albatross* station D2377 in 200 fathoms (366 meters), in the northern part of the Gulf of Mexico. Specimens from a number of other stations in this area are very similar in their characters.

Bolivina subaenariensis, var. mexicana—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ″		°F.		
17128	U.S.N.M.	7	D2313...	32 53 00 N.; 77 53 00 W..	99	57.2	crs. s. bk. sp.	Common.
17129	U.S.N.M.	8	D2377...	29 07 30 N.; 88 08 00 W..	210	67.0	gy. m.......	Common.
17130	U.S.N.M.	5	D2378...	29 14 30 N.; 88 09 30 W..	68	....	gy. m.......	Few.
17131	U.S.N.M.	4	D2399...	28 44 00 N.; 86 18 00 W..	196	51.6	gy. m.......	Few.
17132	U.S.N.M.	5	D2400...	28 41 00 N.; 86 07 00 W..	169	....	gy. m.......	Few.
17133	U.S.N.M.	4	....	Off Fowey Rocks, Fla., E. by N.	100	....	....	Few.
14134	U.S.N.M.	2	....	Off Key West, Fla.......	78	....	....	Rare.

BOLIVINA SUBSPINESCENS, new species.

Plate 7, fig. 5.

Description.—Test minute, elongate, tapering, apical end bluntly pointed, apertural end angular, periphery lobulated; chambers distinct, angular, concave, ventral, the outer portion smooth, the lower angle finely spinose; sutures distinct, depressed, wall calcareous, outer part smooth, remainder covered with short close-set spines, in the early portion granular, roughened; aperture rounded; color white.

Length 0.15–0.25 mm.

Distribution.—Type-specimen (U.S.N.M. No. 17080) from *Albatross* station D2192, in 1,060 fathoms (1,938 meters), off the northeast coast of the United States. Similar specimens have also occurred at scattered stations in the Gulf of Mexico and in the Caribbean.

This species is somewhat similar to *B. spinescens* Cushman, but the angular form of the chambers is much more marked and the whole more definitely tapering. This may be possibly the same as the European material referred to *B. textilarioides* Reuss. It is a very small species, but its characters seem to be very definite.

Bolivina subspinescens—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
17080	U.S.N.M.	1	D2192...	39 46 30 N.; 70 14 45 W..	1,060	38.6	gy. oz.......	Rare.
17081	U.S.N.M.	1	D2396...	28 34 00 N.; 86 48 00 W..	335	....	gy. m.......	Rare.
17082	U.S.N.M.	1	D2639...	25 04 50 N.; 80 15 10 W..	56	....	co. s........	Rare.
17083	U.S.N.M.	1	H58.....	17 45 20 N.; 65 35 35 W..	1,345	....	oz. for.......	Rare.

BOLIVINA TEXTILARIOIDES Reuss.

Under this name numerous authors record specimens from about the British Isles, off the Abrohlos Bank, off Burdwood Bank, and in the Indo-Pacific. The earlier records from the British Isles were confused with *B. laevigata*. Apparently the northern Atlantic material is not closely like that of Reuss. Brady's figure in the *Challenger* Report referred to this species is also different from that of Reuss as I have previously noted (pt. 2, 1911, p. 46). There is nothing in the western Atlantic material which can be referred to it. The nearest is the species here described as *B. subspinescens*.

BOLIVINA TORTUOSA Brady.

Plate 9, fig. 5.

Bolivina tortuosa H. B. BRADY, Quart. Journ. Micr. Soc., vol. 21, 1881, p. 57; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 420, pl. 52, figs. 31–34.—EGGER, Abh. kön. bay. Akad. Wiss. München, Cl. II, vol. 18, 1893, p. 298, pl. 8, figs. 43, 44.—MILLETT, Journ. Roy. Micr. Soc., 1900, p. 543.—CHAPMAN, Journ. Linn. Soc. Zool., vol. 28, 1900, p. 187; 1902, p. 382.—EARLAND, Journ. Quekett Micr. Club, ser. 2, vol. 9, 1905, p. 209.—HERON-ALLEN and EARLAND, Journ. Roy. Micr. Soc., 1908, p. 317, pl. 10, figs. 3, 4.—SIDEBOTTOM, Mem. Proc. Manchester Lit. Philos. Soc., vol. 54, pt. 3, 1910, p. 13.—HERON-ALLEN and EARLAND, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 66, pl. 5, fig. 1; Journ. Roy. Micr. Soc., 1916, p. 43; Trans. Linn. Soc. Zool., ser. 2, vol. 11, 1916, p. 240.—SIDEBOTTOM, Journ. Roy. Micr. Soc., 1918, p. 127.

Description.—"Test elongate, tapering, broadest near the apertural end; the margins bent obliquely towards the median line on either side, so as to give to the entire shell a twisted contour; peripheral edge thin, sharp, lobulated. Segments numerous; long and narrow; the later ones projecting and rounded at the peripheral ends. Shell conspicuously perforated."

"Length, 1/60th inch (0.42 mm) more or less."

Distribution.—Brady figures two forms in the *Challenger* Report, one a shorter broader form from the South Pacific, and a larger, more tapering form from the Cape Verde Islands in shallow water. Except for Sidebottom's records from the Mediterranean, most other records are from either the region of the British Isles or from the Indo-Pacific. It does not occur as far as I have seen in the western Atlantic.

BOLIVINA VARIABILIS (Williamson).

Plate 4, fig. 3.

Textularia variabilis (*typica*) WILLIAMSON, Rec. Foram. Great Britain, 1858, p. 76, pl. 6, figs. 162, 163.

Bolivina variabilis CHASTER, First Report Southport Soc. Nat. Sci., 1890–91 (1892), pp. 59, 69.—HERON-ALLEN and EARLAND, Journ. Roy. Micr. Soc., 1908, p. 336; Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 68; Journ. Roy. Micr. Soc., 1916, p. 43; Trans. Linn. Soc. Zool., ser. 2, vol. 11, 1916, p. 242.

Heron-Allen and Earland distinguish this species in the region of the British Isles where it seems to be abundant.

Genus PLEUROSTOMELLA Reuss, 1860.

Nodosaria (part) REUSS, Verst. Böhm. Kried., pt. 1, 1845, p. 28.

Dentalina (part) REUSS, Haidinger's Nat. Abhandl., vol. 4, 1850, p. 24.

Pleurostomella REUSS (type, *P. subnodosa* Reuss), Sitz. Akad. Wiss. Wien, vol. 40, 1860, p. 203.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 410.—CHAPMAN, The Foraminifera, 1902, p. 174.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 2, 1911, p. 49.

Description.—Test elongate, somewhat compressed, composed of numerous chambers, usually biserially arranged; wall calcareous, perforate, smooth or ornamented; aperture distinctive, an arched opening with a vertical notch or slit in the middle of the lower edge, usually with tooth-like projections upward at either side.

This genus is almost entirely confined to the Pacific and Indian oceans. There are records of its occurrence as far back as the Cretaceous, but Tertiary records seem to be very rare.

PLEUROSTOMELLA SUBNODOSA (Reuss).

Nodosaria nodosa Reuss (part), Verst. Böhm. Kreid., pt. 1, 1845, p. 28, pl. 13, fig. 22.

Dentalina subnodosa Reuss (part), Haidinger's Nat. Abhandl., vol. 4, 1850, p. 24, pl. 1, fig. 9.

Pleurostomella subnodosa Reuss, Sitz. Akad. Wiss., Wien. vol. 40, 1860, p. 204, pl. 8, fig. 2*a*, *b*.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 412, pl. 52, figs. 12, 13.—Pearcey, Trans. Hist. Nat. Soc. Glasgow, vol. 2, 1890, p. 177.—Chapman, Proc. Zool. Soc. London, 1895, p. 25; Journ. Linn. Soc. London, vol. 30, 1910, p. 405.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 2, 1911, p. 51, figs. 82*a–c* (in text); Bull. 100, U. S. Nat. Mus., vol. 4, 1921, p. 139.

Description.—Test much elongate, very slightly compressed, nearly cylindrical, hardly tapering, the apical end broadly rounded, the apertural end subacute in front view, rounded in side view; chambers several, the very early ones biserial, the later uniserial, but with oblique sutures showing the traces of the biserial condition; aperture fairly broad; sinus broad with slight projections at each side; color white.

Length 0.65–0.90 mm.

Distribution.—In the *Challenger* Report Brady notes the appearance of this species in the South Atlantic in deep water, 2,200 and 2,350 fathoms (4,024 and 4,298 meters). Pearcey records it from the warm area of the Faroe Channel as very rare. I have not seen the species in any of the material I have examined from the Atlantic. It seems to be open to question whether or not this recent species from deep water is the same as that described by Reuss from the Cretaceous, but I have had no specimens to determine this.

PLEUROSTOMELLA ACUMINATA, new species.

Plate 19, fig. 6.

Pleurostomella alternans H. B. Brady (part) (not Schwager), Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 412, pl. 51, fig. 22 (not fig. 23).

Description.—Test elongate, subcylindrical or fusiform, the initial end pointed and terminating in a definite spine; apertural end in front view broadly rounded, in side view acute and tapering; chambers of the early portion crowded, later ones much less so, biserial, inflated; sutures, distinct, slightly depressed; wall smooth, finely punctate; aperture narrow, vertical, with an upwardly projecting tooth at either side, the whole in a rounded depression of the inner face of the chamber; color white.

Length about 0.5 mm.

Distribution.—Type-specimen (U.S.N.M. No. 16275) from *Albatross* station H79 in 821 fathoms (1,488 meters) in the Caribbean Sea. Atlantic records for *Pleurostomella* are very few and it is interesting to note that this species comes from a region which by other species allies itself with the Pacific rather than with the Atlantic in general. Brady's records for *P. alternans* which include this species are from the Pacific. There is, however, one record in the volume on "Summary of Results" which gives *P. alternans* from station 35*c*, in 1,950 fathoms (3,566 meters), latitude 32° 15′ N., longitude 65° 08′ W. This may be the same as the specimens which I have referred to *P. alternans*[16] from off the Galapagos Islands.

Pleurostomella acuminata—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
16275	U.S.N.M.	1	H79.....	14° 20′ 30″ N.; 63° 10′ 00″ W..	821	....	co. s. sh. for.	Rare.

Genus PAVONINA d'Orbigny, 1826.

Pavonina D'ORBIGNY (type, *P. flabelliformis* d'Orbigny), Ann. Sci. Nat., vol. 7, 1826, p. 260.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 374.—CHAPMAN, The Foraminifera, 1902, p. 169.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 2, 1911, p. 30.

Description.—Test calcareous, hyaline, perforate, many chambered, the early chambers biserial, the later ones becoming uniserial, broad, curved, in the type species finally becoming embracing, and the embracing series each composed of one or more chambers; apertures numerous on the peripheral margin.

There seem to be two distinct species of this genus, the type species, *P. flabelliformis* d'Orbigny, found in the Indo-Pacific, from Honolulu, southward to Torres Strait and westward to Madagascar, and the other found in the West Indies.

PAVONINA ATLANTICA, new species.

Plate 19, fig. 1.

Description.—Test subtriangular, slightly longer than broad, initial end with a short spine, very much compressed, the sides carinate; chambers comparatively few, the earliest ones alternating, biserial, those of the adult uniserial, broad, extending across the width of the test, slightly curved backward at the ends; sutures somewhat limbate, wall thin and translucent, finely perforate; apertures numerous on the terminal wall of the last-formed chamber.

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[16] Cushman, Bull. 71, U. S. Nat. Mus., pt. 2, 1911, p. 50, figs. 81*a*, *b* (in text).

Length up to 0.5 mm.

Distribution.—Type-specimen (U.S.N.M. No. 17272) from off Sand Key, Florida, in 92 fathoms (169 meters). Specimens have also occurred off Ragged Key, Florida., in 75 fathoms (137 meters), off Fowey Rocks, 55 fathoms (99 meters), and in shallow water of the Tortugas lagoon. Brady records *P. flabelliformis* from *Challenger* station 24, in 390 fathoms (713 meters), off Culebra Island in the West Indies. This is probably the same as this species here described, as all the Florida material I have seen appears to be of this new species, not showing at all the embracing character of *P. flabelliformis*.

Pavonina atlantica—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
17268	U.S.N.M.	1	D2420	37 03 20 N.; 74 31 40 W.	104	47.7	bk. s. m. g.	Rare.
17269	U.S.N.M.	1	D2641	25 11 30 N.; 80 10 00 W.	60	69.2	co. s.	Rare.
17270	U.S.N.M.	1		Ragged Key, Fla.	75			Rare.
17271	U.S.N.M.	1		Off Fowey Rocks, Fla., E. by S.	55			Rare.
17272	U.S.N.M.	1		Off Sand Key, Fla.	92			Rare.

Genus CUNEOLINA d'Orbigny, 1839.

Cuneolina D'ORBIGNY (type, *Cuneolina pavonina* d'Orbigny), in De la Sagra. Hist. Fis. Pol. Nat. Cuba, 1839, "Foraminifères," p. 150; Foram. Foss. Bass. Tert. Vienne, 1846, p. 253.—CHAPMAN, The Foraminifera, 1902, p. 166.

Description.—Test biserial, tapering, broadest near the apertural end, compressed so that the two alternating series of chambers form a zigzag line on the narrow sides of the test; chambers numerous, low, and very broad, wall arenaceous, composed of very thin material, smooth, chamber wall labyrinthic, composed of numerous openings, the smaller near the exterior; aperture elongate, narrow, either simple or a row of pores.

This genus was erected by d'Orbigny for certain Cretaceous species. There are certain species in the West Indies which occur in the late Tertiary which seem close to this genus in several ways. They have been referred to d'Orbigny's type species, but are evidently different, as will be noted later.

CUNEOLINA ANGUSTA Cushman.

Plate 10, figs. 1-3.

Textularia trochus Goës (not d'Orbigny), Köngl. Svensk. Vet. Akad. Handl., vol. 19, No. 4, 1882, p. 80, pl. 5, figs. 167-170; pl. 6, figs. 171, 172.

Cuneolina pavonina D'ORBIGNY, var. *angusta* CUSHMAN, Publ. 291, Carnegie Inst. Wash., 1919, p. 34, pl. 7, fig. 2.

Description.—Test elongate, triangular, usually twice as long as wide, thence gradually tapering to the subacute apex, compressed, in a plane parallel to that of the junction between the chambers; chambers broader than high, distinct, labyrinthic, consisting of numerous chamberlets, those of the exterior smaller and more numerous than those of the inner portion; sutures distinct, very slightly depressed, wall arenaceous, of fine sand grains with an abundance of cement forming a very smooth surface; aperture elongate, either a simple fissure, or by contractions forming a series of pores; color grayish-brown.

Length up to 7 mm.

Distribution.—The type-specimens were from the Bowden Marl, Jamaica (Miocene) where it was found in the following variety. It has occurred in the region of the West Indies, living off the Barbados in 100 fathoms (183 meters), off Key West, Florida, 78 fathoms (143 meters), and at *Fish Hawk* Station 949, off the eastern coast of the United States.

From a study of the original figures and description of d'Orbigny, it seems that the Cretaceous *Cuneolina pavonina* d'Orbigny is undoubtedly different from that which occurs in the Miocene or recent material. That name being available for the recent or Tertiary form necessitates the adoption of *angusta* Cushman as the name for the recent species and the narrow variety already described from Bowden, Jamaica. This leaves the broad form of Bowden which has been referred to as *C. pavonina* without a name. All the recent material I have seen seems to belong to *C. angusta*.

Cuneolina angusta—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
16891	U.S.N.M.	10	....	Off Barbados............	100	....	....	Common.
16892	U.S.N.M.	9	*Fish Hawk* 949.	40° 03′00″ N.; 70° 31′00″ W.	100	52.0	yl. m.	Common.
16893	U.S.N.M.	4	....	Off Key West, Fla.......	78	....	....	Few.

CUNEOLINA ANGUSTA Cushman, var. LATA, new variety.

Cuneolina pavonina Jones and Parker (not d'Orbigny), Ann. Soc. Mal. Belg., vol. 11, 1876, p. 98.—Hill, Bull. Mus. Comp. Zoöl., vol. 34, 1899, p. 147.—Cushman, Publ. 291, Carnegie Inst. Wash., 1919, p. 34, pl. 7, fig. 1.

This variety which has been noted by several authors from the Miocene Marl of Bowden, Jamaica, is, as already noted, different from *C. pavonina* d'Orbigny from the Cretaceous, and according to the rules of nomenclature must, under the circumstances, have a new name applied to it, which I have here done. This is the broad form which I have described and figured from Bowden in the above reference, and the breadth of which is nearly equal to the length.

It has not occurred as a recent form so far as I have seen.

Subfamily 3. VERNEUILININAE.

This subfamily includes those genera which, at least in their early development, have a distinctly triserial arrangement of the chambers. In *Verneuilina* this method of arrangement is continued throughout the development of the test, but in other genera becomes modified. In *Gaudryina* the early portion of the test is triserial and the adult arrangement is biserial and comparable to *Textularia*. In *Clavulina* there is still another regressive step and the young are triserial, while the adult arrangement is uniserial with a central aperture.

Genus VERNEUILINA d'Orbigny, 1840.

Verneuilina d'Orbigny (type, *V. tricarinata* d'Orbigny), Mém. Soc. Géol. France, ser. 1, vol. 4, 1840, p. 38.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 382.—Chapman, The Foraminifera, 1902, p. 166.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 2, 1911, p. 52.

Bulimina (part) Reuss, Verst. Böhm. Kreid., pt. 2, 1845, p. 109, and other authors.

Polymorphina (part) Schultze, Organ. Polyth., 1854, p. 61.

Textularia (part) Parker and Jones, Philos. Trans., vol. 155, 1865, p. 371; and other authors.

Description.—Test free, more or less elongate, tapering, in cross section round or triangular, composed of a series of chambers spirally arranged, but in three vertical columns; walls variable, arenaceous or hyaline; aperture a slit at or near the base of the inner margin of the chamber.

In general the genus *Verneuilina* may be used to include all the definitely triserial species which have a slit-like aperture at the base of the inner margin of the chamber. This is apparently the primitive genus from which have developed such genera as *Gaudryina*, and in its relations to *Textularia*, *Verneuilina* may be taken as the simplest member of the subfamily *Verneuilininae*. It includes a number of well characterized species, some of them rather common and of wide distribution.

There are records of this genus running back to the Lower Cretaceous.

VERNEUILINA SCABRA (Williamson).

Bulimina scabra WILLIAMSON, Rec. Foram. Great Britain, 1858, p. 65, pl. 5, figs. 136, 137 (*B. arenacea* on explanation of plate).

Textularia scabra FISCHER, Actes Soc. Linn. Bordeaux, vol. 27, 1870, p. 393, no. 32.

Verneuilina polystropha PARKER and JONES, Introd. Foram., Appendix, 1862, p. 311.—H. B. BRADY, Ann. Mag. Nat. Hist., ser. 5, vol. 1, 1878, p. 436, pl. 20, figs. 9*a–c*.—BALKWILL and WRIGHT, Proc. Roy. Irish Acad., ser. 3, vol. 3, 1882, p. 447.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 386, pl. 47, figs. 15–17.—BALKWILL and WRIGHT, Trans. Roy. Irish Acad., vol. 28, 1885, p. 332.—H. B. BRADY, Journ. Roy. Micr. Soc., 1887, p. 896.—WRIGHT, Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 472.—ROBERTSON, Trans. Nat. Hist. Soc. Glasgow, vol. 3, pt. 3, 1892, p. 240.—GÖES, Köngl. Svensk. Vet. Akad. Handl., vol. 25, No. 9, 1894, p. 32, pl. 7, figs. 247–255.—WHITEAVES, Geol. Survey Canada, 1901, p. 10.—EARLAND, Journ. Quekett Micr. Club, ser. 2, vol. 9, 1905, p. 206.—CUSHMAN, Proc. Boston Soc. Nat. Hist., vol. 34, 1908, p. 27.—HERON-ALLEN and EARLAND, Proc. Roy. Irish Acad., vol. 31, No. 64, 1913, p. 55, pl. 4, figs. 1–5; Journ. Roy. Micr. Soc., 1916, p. 42; Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 231.

Textularia, var. *V. polystropha* DAWSON, Ann. Mag. Nat. Hist., vol. 8, 1870, p. 178; vol. 7, ser. 4, 1871, p. 88; Amer. Journ. Sci. Arts, vol. 1, ser. 3, 1871, p. 198.

Description.—Test elongate, tapering, triserial, the apical end bluntly rounded; chambers comparatively few, inflated; sutures distinct, depressed, wall coarsely arenaceous, surface slightly roughened; aperture oval, at the base of the inner margin of the last-formed chamber, in a depression formed at the junction of the three last-formed chambers; color reddish-brown.

Length up to 1 mm.

Distribution.—This seems to be very common in shallow water off the northern coast of Europe, especially about the British Isles. There are records of its occurrence in the Gulf of St. Lawrence, and off the New England coast. It is evidently a species of cool northern waters, but very rare on the American side of the Atlantic, and not found at all on the southern Atlantic coast or in the Gulf of Mexico or in the Caribbean. This may be the same species as that described and figured by Schultze as *Polymorphina silicea*,[17] but is evidently not the same as *Bulimina polystropha* Reuss, which he described from the Cretaceous. Heron-Allen and Earland in their Clare Island Report mention that at a few stations "a minute variety occurs in very small numbers, which we have observed at many other localities where the larger type is abundant. It exactly resembles the common types, but has normally only one-eighth of their size, though often possessing a greater number of chambers than the larger specimens. The average length of these dwarf specimens is from .17–.30 mm., and their average breadth .07–.10 mm. It is possible that these minute individuals may represent the mircospheric form, but owing to the difficulty of observing the primordial chambers in this species, we are unable to make any pronouncement of this point." Off the New England coast in Casco Bay a small species occurs which fits rather well this description, and which may be known as variety *advena*, new variety. This may prove to be a different species as it is not usual for the microspheric form to have a smaller adult test than the megalospheric.

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[17] Organ. Polythal., 1854, p. 61, pl. 6, figs. 10, 11.

Verneuilina scabra—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
......	J.A.C.	7	....	Log. 8, "*Flying Falcon*" 11 miles south of Glandore Harbor, southwest of Ireland.	53	....	....	Common.

VERNEUILINA PROPINQUA H. B. Brady.

Plate 9, figs. 10, 11.

Verneuilina propinqua H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 387, pl. 47, figs. 8–12 (not 13, 14).—Pearcey, Trans. Nat. Hist. Soc. Glasgow, vol. 2, 1890, p. 176.—Picaglia, Atti. Soc. Modena, ser. 3, vol. 12, 1893, p. 155.—Goës, Köngl. Svensk. Vet. Akad. Handl., vol. 25, No. 9, 1894, p. 33, pl. 7, figs. 264–266.—Chapman, Proc. Zool. Soc. London, 1895, p. 19.—Goës, Bull. Mus. Comp. Zoöl., vol. 29, 1896, p. 38.—Flint, Rep. U. S. Nat. Mus., 1897 (1899), p. 285, pl. 31, fig. 2.—Chapman, Journ. Linn. Soc. London, vol. 30, 1910, p. 402.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 2, 1911, p. 53, figs. 86*a*, *b* (in text); Bull. 100, U. S. Nat. Mus., vol. 4, 1921, p. 140.

Description.—Test free, pyramidal, triserial, the apical end bluntly rounded; chambers well inflated but closely set; wall coarsely arenaceous, the surface somewhat rough or nearly smooth; aperture elongate at the base of the inner margin of the chamber; color brown, or gray.

Length up to 3.6 mm.

Distribution.—This species described by Brady from the *Challenger* material was recorded from five stations in the North Atlantic, one station in 100 fathoms (183 meters), and the others in 1,000 to 2,435 fathoms (1,829 to 4,415 meters), and at one station in the South Atlantic in 1,900 fathoms (3,475 meters). On the European side of the Atlantic it occurs in the warm area of the Faroe Channel (Pearcey), and in the Atlantic 1,750 meters (955 fathoms) (Goës). From the western Atlantic Goës records it from the Caribbean in 196 to 1,181 fathoms (359 to 2,160 meters), and Flint from a number of stations, four off the eastern coast of the United States, two in the Gulf of Mexico, and one off the coast of Brazil, ranging in depth from 732 to 1,226 fathoms (1,339 to 2,243 meters).

I have seen material from but three stations and two of these off the northeastern coast of the United States, the other in the northern part of the Gulf of Mexico.

Verneuilina propinqua—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
16866	U.S.N.M.	5	D2039...	38 19 26 N.; 68 20 20 W..	2639	....	glob. oz.....	Common.
16867	U.S.N.M.	1	D2096...	39 22 20 N.; 70 52 20 W..	1451	37.5	glob. oz.....	Rare.
16868	U.S.N.M.	5	D2394...	28 38 30 N.; 87 02 00 W..	420	41.8	gn. m.......	Few.

VERNEUILINA ADVENA Cushman.

Plate 9, figs. 7–9.

Verneuilina polystropha Heron-Allen and Earland (not Reuss), minute form, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 55 (in part), pl. 4, figs. 3–5 (not 1, 2).

Verneuilina advena Cushman, Res. Hudson Bay Exped., 1920, no. 9, 1922, p. 9.

Description.—Variety differing from the typical in the smaller size and more slender form.

Length 0.17–0.30 mm.; breadth 0.07–0.1 mm.

Distribution.—This small variety is more closely allied with *V. arenacea* (Williamson), than any other species and seems to be found on both sides of the Atlantic.

Heron-Allen in the above reference refer to it as follows:

> At a few stations a minute variety occurs in very small numbers, which we have observed at many other localities wherethe larger type [*V. polystropha*] is abundant. It exactly resembles the common types, but is normally only one-eighth of their size, though often possessing a far greater number of chambers than the larger specimens. . . . . It is possible that these minute individuals may represent the microspheric form, but, owing to the difficulty of observing the primordial chamber in this species, we are unable to make any definite pronouncement in this point.

Figures of the typical form after Williamson are given on plate 10, figures 5, 6.

Verneuilina advena—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
17068	U.S.N.M.	2	23	Casco Bay, Me..........	....	....	....	Rare.

VERNEUILINA AFFIXA Cushman.

Plate 8, fig. 2, plate 10, fig. 4.

Verneuilina propinqua H. B. Brady (part), Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 387, pl. 47, figs. 13, 14 (not figs. 8–12).—Goës, Bull. Mus. Comp. Zoöl., vol. 29, 1896, p. 38.

Verneuilina affixa Cushman, Bull. 71, U. S. Nat. Mus., pt. 2, 1911, p. 56, figs. 90, 91 (in text); Bull. 100, U. S. Nat. Mus., vol. 4, 1921, p. 142, pl. 27, fig. 6.

Description.—Test affixed, pyramidal, tapering to a rather acute point at the apical end, triserial except at the attached end, which may be biserial in the attached chambers; test usually somewhat curved; wall coarsely arenaceous, but only slightly roughened on the surface; aperture at the base of the inner margin of the chamber in an elongated depression formed by the last-formed whorl of chambers, rounded or somewhat elongate; color reddish-brown, except the attached chambers, and the area of attachment about the chambers, which are light gray.

Length up to 4 mm.

Distribution.—This species which was named on the basis of *Albatross* specimens from the western coast of Mexico seems to be fairly common in the western Atlantic. The records range from the latitude of Cape Cod south with a few stations in the Gulf of Mexico, off Yucatan, and off the coast of Brazil. As Brady notes, this species is very different from *V. propinqua* H. B. Brady, is more tapering, higher, and very often bent toward the tip, the aperture is larger in a rather deep reentrant at the end; and toward the end it often becomes biserial. Adult specimens are usually gray near the end, showing their base of attachment.

Verneuilina affixa—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance
				° ′ ″ ° ′ ″		°F.		
17046	U.S.N.M.	2	D2035	39 26 16 N.; 70 02 37. W.	1,362		glob. oz.	Rare.
17047	U.S.N.M.	3	D2037	38 53 00 N.; 69 23 30 W.	1,731	38.0	glob. oz.	Rare.
17048	U.S.N.M.	4	D2041	39 22 50 N.; 68 25 00 W.	1,608	38.0	glob. oz.	Few.
17049	U.S.N.M.	1	D2042	39 33 00 N.; 68 26 45 W.	1,555	38.5	glob. oz.	Rare.
17050	U.S.N.M.	4	D2043	39 49 00 N.; 68 28 30 W.	1,467	38.5	glob. oz.	Few.
17051	U.S.N.M.	1	D2096	39 22 20 N.; 70 52 20 W.	1,451	37.5	glob. oz.	Rare.
17052	U.S.N.M.	2	D2105	37 50 00 N.; 73 03 50 W.	1,395	41.0	glob. oz.	Rare.
17053	U.S.N.M.	1	D2110	35 12 10 N.; 74 57 15 W.	516	40.0	bu. m.	Rare.
17054	U.S.N.M.	1	D2208	39 33 00 N.; 71 16 15 W.	1,178	38.4	gn. m.	Rare.
17055	U.S.N.M.	1	D2219	39 46 22 N.; 69 29 00 W.	948	38.8	gy. m.	Rare.
17056	U.S.N.M.	3	D2221	39 05 30 N.; 70 44 30 W.	1,525	36.9	gy. oz.	Few.
17057	U.S.N.M.	1	D2394	28 38 30 N.; 87 02 00 W.	420	41.8	gn. m.	Rare.
17058	U.S.N.M.	1	D2355	20 56 48 N.; 86 27 00 W.	399		yl. oz.	Rare.
17059	U.S.N.M.	1	D2381	28 05 00 N.; 87 56 15 W.	1,330		lt. br. m.	Rare.
17060	U.S.N.M.	10	D2383	28 32 00 N.; 88 06 00 W.	1,181	39.6	br. gn. m.	Common.
17061	U.S.N.M.	10	D2385	28 51 00 N.; 88 18 00 W.	730	40.1	gy. m.	Common.
17062	U.S.N.M.	1	D2399	20 44 00 N.; 86 18 00 W.	196	51.6	gy. m.	Rare.
17063	U.S.N.M.	1	D2562	39 15 30 N.; 71 25 00 W.	1,434	37.3	gy. oz.	Rare.
17064	U.S.N.M.	3	D2572	40 29 00 N.; 66 04 00 W.	1,769	37.8	gy. oz.	Rare.
17065	U.S.N.M.	4	D2682	39 38 00 N.; 70 22 00 W.	990		gn. m.	Few.
17066	U.S.N.M.	4	D2706	41 28 30 N.; 65 35 30 W.	1,188		gy. oz. for.	Few.
17067	U.S.N.M.	1	D2760	12 07 00 S.; 37 17 00 W.	1,019	39.5	br. co.	Rare.

VERNEUILINA BRADYI Cushman.

Plate 11, fig. 1.

Verneuilina pygmaea H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 385, pl. 47, figs. 4-7 (not *Bulimina pygmaea* Egger).—Wright, Ann. Mag. Nat. Hist., ser. 6, vol. 4, 1889, p. 448; Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 472.—Pearcey, Trans. Nat. Hist. Soc. Glasgow, vol. 2, 1890, p. 176.—Chapman, Proc. Zool. Soc. London, 1895, p. 19.—Flint, Rep. U. S. Nat. Mus., 1897 (1899), p. 285, pl. 31, fig. 1.—Chapman, Journ. Linn. Soc. London, vol. 30, 1910, p. 402.—Awerinzew, Mem. Acad. Imp. Sci. St. Petersburg, ser. 8, vol. 29, no. 3, 1911, p. 17.—Heron-Allen and Earland, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 55, pl. 4, fig. 10.—Sidebottom, Journ. Roy. Micr. Soc., 1918, p. 21.

Verneuilina propinqua Goës, Bull. Mus. Comp. Zoöl., vol. 29, 1896, p. 38 (part).

Verneuilina bradyi Cushman, Bull. 71, U. S. Nat. Mus., pt. 2, 1911, p. 54, figs. 87*a*, *b*.—Pearcey, Trans. Roy. Soc. Edinburgh, vol. 49, 1914, p. 1013.—Cushman, Bull. 100, U. S. Nat. Mus., vol 4, 1921, p. 141, pl. 27, fig. 4.

Description.—Test pyramidal, the triserial chambers inflated, the wall finely arenaceous; about five visible chambers in each vertical series; surface smooth, but not usually polished; aperture an elongate slit near the base of the inner margin of the chamber, occasionally with a thickened lip; color light gray.

Length 0.60–1.50 mm.

Distribution.—This is a species which seems to be characteristic of *Globigerina*-ooze. It is very widely distributed in the deeper water of all the oceans under such conditions. About the British Isles it is found only in deep water, Wright's records being southwest of Ireland, 750 to 1,020 fathoms (1,370 to 1,866 meters). Heron-Allen and Earland record a single specimen from the Clare Island region. Pearcy records it from the Faroe Channel. The *Challenger* records include fourteen stations in the northern Atlantic, ranging in depth from 420 to 2,750 fathoms (768 to 5,030 meters), and six in the South Atlantic, 675 to 2,475 fathoms (1,234 to 4,527 meters). In the western Atlantic Flint records the species from the Gulf of Mexico in 347 and 1,181 fathoms (635 and 2,160 meters). I have had the species from a considerable number of stations in the *Albatross* collections, most of them off the northeastern coast of the United States, but others scattered off the southeastern coast of the United States, in the Gulf of Mexico, and in the Caribbean Sea. Awerinzew records this from the Arctic, Pearcey from the Antarctic, and it is also recorded in both the North and South Pacific, mostly in deep water.

Verneuilina bradyi should be used for this recent species instead of *V. pygmaea* Egger, as has already been shown in a previous paper (Bull. 71, pt. 2, p. 55).

Verneuilina bradyi—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°*F.*		
16821	U.S.N.M.	1	D2003...	37 16 30 N.; 74 20 36 W..	641	......	....	Rare.
16822	U.S.N.M.	6	D2029...	39 42 00 N.; 70 47 00 W..	1,168	38.5	gy. m........	Common.
16823	U.S.N.M.	2	D2035...	39 26 16 N.; 70 02 37 W..	1,362	......	glob. oz......	Rare.
16824	U.S.N.M.	1	D2036...	38 52 40 N.; 69 24 40 W..	1,735	38.0	glob. oz......	Rare.
16825	U.S.N.M.	5	D2037...	38 53 00 N.; 69 23 30 W..	1,731	38.0	glob. oz......	Few.
16826	U.S.N.M.	1	D2041...	39 22 50 N.; 68 25 00 W..	1,608	38.0	glob. oz......	Rare.
16827	U.S.N.M.	1	D2042...	39 33 00 N.; 68 26 45 W..	1,555	38.5	glob. oz......	Rare.
16828	U.S.N.M.	2	D2050...	39 42 50 N.; 69 21 20 W..	1,050	44.5	glob. oz......	Rare.
16829	U.S.N.M.	4	D2052...	39 40 05 N.; 69 21 25 W..	1,098	45.0	glob. oz......	Few.
16830	U.S.N.M.	5	D2093...	39 42 50 N.; 71 01 20 W..	1,000	39.0	for. s. m......	Few.
16831	U.S.N.M.	2	D2105...	37 50 00 N.; 73 03 50 W..	1,395	41.0	glob. oz......	Rare.
16832	U.S.N.M.	1	D2117...	15 24 20 N.; 63 31 30 W..	683	39.8	yl. m. fne. s..	Rare.
16833	U.S.N.M.	1	D2138...	17 44 05 N.; 75 39 00 W..	23	......	co. brk. sh...	Rare.
16834	U.S.N.M.	8	D2144...	9 49 00 N.; 79 31 30 W..	896	......	gn. m........	Common.
16835	U.S.N.M.	1	D2204...	39 30 30 N.; 71 44 30 W..	728	39.1	br. m........	Rare.
16836	U.S.N.M.	1	D2205...	39 35 00 N.; 71 18 45 W..	1,073	38.1	gy. oz........	Rare.
16837	U.S.N.M.	3	D2208...	39 33 00 N.; 71 16 15 W..	1,178	38.4	gn. m........	Few.
16838	U.S.N.M.	2	D2335...	23 10 39 N.; 82 20 21 W..	204	......	....	Rare.
16839	U.S.N.M.	3	D2381...	28 05 00 N.; 87 56 15 W..	1,330	......	lt. br. m.....	Few.
16840	U.S.N.M.	1	D2392...	28 47 30 N.; 87 27 00 W..	724	40.7	br. gy. m....	Rare.
16841	U.S.N.M.	5	D2393...	28 43 00 N.; 87 14 30 W..	525	41.1	lt. gy. m.....	Few.
16842	U.S.N.M.	2	D2394...	28 38 30 N.; 87 02 00 W..	420	41.8	gn. m........	Rare.
16843	U.S.N.M.	1	D2395...	28 36 15 N.; 86 50 00 W..	347	44.1	gy. m........	Rare.
16844	U.S.N.M.	1	D2542...	40 00 15 N.; 70 42 20 W..	129	47.2	s. brk. sh....	Rare.
16845	U.S.N.M.	2	D2564...	39 22 00 N.; 71 23 30 W..	1,390	37.3	gy. oz........	Rare.
16846	U.S.N.M.	1	D2566...	37 23 00 N.; 68 08 00 W..	2,620	36.4	gy. oz........	Rare.
16847	U.S.N.M.	2	D2568...	39 15 00 N.; 68 08 00 W..	1,781	36.9	gy. oz........	Rare.
16848	U.S.N.M.	1	D2572...	40 29 00 N.; 66 04 00 W..	1,769	37.8	gy. oz........	Rare.
16849	U.S.N.M.	4	D2573...	40 34 18 N.; 66 09 00 W..	1,742	37.3	gy. m. s......	Few.
16850	U.S.N.M.	1	D2581...	39 43 00 N.; 71 34 00 W..	394	......	gn. m........	Rare.
16851	U.S.N.M.	1	D2678...	32 40 00 N.; 76 40 30 W..	731	38.7	lt. gy. oz.....	Rare.
16852	U.S.N.M.	1	D2679...	32 40 00 N.; 76 40 30 W..	782	38.6	lt. gy. oz.....	Rare.
16853	U.S.N.M.	2	D2684...	39 35 00 N.; 70 54 00 W..	1,106	......	br. c. bk. sp..	Rare.
16854	U.S.N.M.	2	D2706...	41 28 30 N.; 65 35 30 W..	1,188	......	gy. oz. for....	Rare.
16855	U.S.N.M.	3	D2713...	38 20 00 N.; 70 08 30 W..	1,859	......	br. oz........	Few.
16856	U.S.N.M.	1	D2716...	38 29 30 N.; 70 57 00 W..	1,631	......	br. oz. for....	Rare.
16857	U.S.N.M.	2	D2748...	39 31 00 N.; 71 14 30 W..	1,163	37.8	gy. m. for....	Rare.
16858	U.S.N.M.	1	D2751...	16 54 00 N.; 63 12 00 W..	687	40.0	bu. glob. oz..	Rare.

VERNEUILINA SPINULOSA Reuss.

Plate 19, fig. 5.

Verneuilina spinulosa Reuss, Denkschr. Akad. Wiss. Wien, vol. 1, 1850, p. 374, pl. 47, fig. 12.—Egger, Neues Jahrb., 1857, p. 292, pl. 9, figs. 17, 18.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 384, pl. 47, figs. 1-3.—Balkwill and Wright, Trans. Roy. Irish Acad., vol. 28, 1885, p. 333.—H. B. Brady, Journ. Roy. Micr. Soc., 1887, p. 896.—H. B. Brady, Parker, and Jones, Trans. Zool. Soc. London, vol. 12, 1888, p. 219, pl. 42, fig. 15 (not fig. 14).—Wright, Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 472.—Dakin, Rep. Ceylon Pearl-Oyster Fish., vol. 5, 1896, p. 233.—Chapman, Journ. Linn. Soc. London, vol. 28, 1900, p. 185.—Millett, Journ. Roy Micr. Soc., 1900, p. 11.—Sidebottom, Mem. Proc. Manchester Lit. Philos. Soc., vol. 49, No. 5, 1905, p. 10, pl. 2, fig. 5.—Rhumbler, Zool. Jahrb., Abth. Syst., vol. 24, 1906, p. 61, pl. 5, fig. 53.—Bagg, Proc. U. S. Nat. Mus., vol. 34, 1908, p. 132.—Heron-Allen and Earland, Journ. Roy. Micr. Soc., 1908, p. 327.—Sidebottom, Mem. Proc. Manchester Lit. Philos. Soc., vol. 54, pt. 3, 1910, p. 11.—Chapman, Journ. Linn. Soc. London, vol. 30, 1910, p. 402.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 2, 1911, p. 55, figs. 88*a*, *b*, 89 (in text).—Pearcey, Trans. Linn. Soc. Edinburgh, vol. 49, 1914, p. 1039.—Chapman, Biol. Res. *Endeavour*, vol. 3, pt. 1, 1915, p. 311; Bull. 72, Australian Geol. Survey, 1917, p. 13.—Sidebottom, Journ. Roy. Micr. Soc., 1918, p. 22.—Cushman, Publ. 291, Carnegie Inst. Wash., 1919, p. 34; Proc. U. S. Nat. Mus., vol. 59, 1921, p. 51; Bull. 100, U. S. Nat. Mus., vol. 4, 1921, p. 141, pl. 27, fig. 5; Publ. 311, Carnegie Inst. Wash., 1922, p. 28, pl. 3, fig. 11.

Description.—Test pyramidal, three-sided, triangular in transverse section, the sides flat or slightly concave, the initial end acutely pointed; initial end and angles of chambers often with sharp spines; walls of medium thickness, hyaline, or in some cases thickened and rough, perforate, smooth or granular; apertural end of test bluntly angled, the edges of the chambers thickened; aperture a curved slit at the base of the inner edge of the chamber.

Length 0.25–0.75 mm.

Distribution.—From the available records this seems to be a very widely distributed species in shallow water of warm regions. It is, however, known from numerous stations about the British Isles according to published records. In the western Atlantic there are several *Challenger* stations, including two off the Lesser Antilles. Neither Flint or Bagg record this from the Gulf of Mexico or the Caribbean. I have had specimens from a few *Albatross* stations southward from Chesapeake Bay to Key West, and also from Montego Bay, Jamaica, and one station off the coast of Brazil. It was not common at any of these stations, but it was common at station D2758, in 20 fathoms (37 meters), off the coast of Brazil. It seems to be widely spread in the Indo-Pacific in shallow water.

Verneuilina spinulosa—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
16859	U.S.N.M.	1	D2311...	32 55 00 N.; 77 54 00 W..	79	59.1	crs. s. bk. sp.	Rare.
16860	U.S.N.M.	3	D2420...	37 03 20 N.; 74 31 40 W..	104	47.7	bk. s. m. g...	Few.
16861	U.S.N.M.	3	D2614...	34 09 00 N.; 76 02 00 W..	168	....	gy. s. bk. sp.	Few.
16862	U.S.N.M.	5	D2641...	25 11 30 N.; 80 10 00 W..	60	69.2	co. s.........	Few.
16833	U.S.N.M.	9	D2758...	6 59 00 S.; 34 47 00 W..	20	79.0	brk. sh......	Common.
16864	U.S.N.M.	3	....	Off Key West, Fla.......	78	....	....	Few.
16865	U.S.N.M.	1	....	Off Sand Key, Fla.......	92	....	....	Rare.

Genus VALVULINA d'Orbigny, 1826.

Valvulina D'ORBIGNY (type, *V. triangularis* d'Orbigny), Ann. Sci. Nat., vol. 7, 1826, p. 270.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 391.—CHAPMAN, The Foraminifera, 1902, p. 171.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 2, 1911, p. 58.

Rotalina (part) WILLIAMSON, Rec. Foram. Great Britain, 1858, p. 55.

Description.—Test spiral, conical, with three chambers in a whorl, umbilicate, usually attached; wall arenaceous, fairly smooth; aperture provided with a valvular tooth; color usually reddish-brown, area of fixation white or light gray.

Species referred to this genus are recorded as far back as the Carboniferous.

The test is typically attached, usually by a large area of fixation, but specimens are often found detached.

VALVULINA TRIANGULARIS d'Orbigny.

Valvulina triangularis D'ORBIGNY, Ann. Sci. Nat., vol. 7, 1826, p. 270, No. 1; Modèles, 1826, No. 25.—HERON-ALLEN and EARLAND, Journ. Roy. Micr. Soc., 1908, p. 331.

Heron-Allen and Earland record a single specimen of this species from shore sands of Sussex, England. This seems to be the only record for it in the Atlantic.

VALVULINA CONICA (Parker and Jones).

Plate 11, figs. 8, 9.

Valvulina triangularis PARKER and JONES, Ann. Mag. Nat. Hist., ser. 2, vol. 19, 1857, p. 295, pl. 11, figs. 15, 16 (not *Valvulina triangularis* d'Orbigny).

Valvulina triangularis PARKER and JONES, var. *conica* PARKER and JONES, Philos. Trans., vol. 155, 1865, p. 406, pl. 15, fig. 27.

Valvulina conica M. SARS, Vid. Selsk. Forh., 1868, p. 249.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 392, pl. 49, figs. 15, 16.—Woodward, New York Micr. Soc., 1885, p. 150.—H. B. Brady, Journ. Roy. Micr. Soc., 1887, p. 896.—H. B. BRADY, PARKER, and JONES, Trans. Zool. Soc., vol. 12, 1888, p. 220, pl. 41, fig. 21; pl. 42, figs. 16, 17.—WRIGHT, Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 472.—GOËS, Köngl. Svensk. Vet. Akad. Handl., vol. 25, No. 9, 1894, p. 39, pl. 8, figs. 342–352.—CHAPMAN, Proc. Zool. Soc. London, 1895, p. 21.—FLINT, Rep. U. S. Nat. Mus., 1897 (1899), p. 286, pl. 31, fig. 3.—WHITEAVES, Geol. Survey Canada, 1901, p. 10.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 2, 1911, p. 58, figs. 93*a*–*c* (in text).—HERON-ALLEN and EARLAND, Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 233.—CUSHMAN, Bull. 100, U. S. Nat. Mus., vol. 4, 1921, p. 142, pl. 27, fig. 7.

Description.—Test typically attached, conical, often with the axis somewhat curved, the apical end bluntly pointed, the affixed end flat and truncate, even concave; chambers arranged spirally, but so as to form a triserial test; wall coarsely arenaceous, rough or fairly smooth on the surface; aperture slit-like, at the inner basal margin of the chamber, protected by a valvular lip; early chambers dark reddish-brown, the later becoming lighter; area of attachment light gray.

Length about 0.50 mm.

Distribution.—This seems to be well distributed in the Atlantic, being recorded from the coasts of Norway and Sweden, 100 to 450 fathoms (183 to 823 meters), Faroe Channel, and the west of Scotland. On the American side of the Atlantic it occurs in the Gulf of St. Lawrence, at numerous stations off the eastern coast of the United States, Bermuda, in the Gulf of Mexico, and on the Abrohlos Bank of Brazil. From an examination of the material I have had it seems that there may be more than one species, as the apical end, even in the conical forms, is quite different, especially in different areas. The species is also recorded from the Mediterranean and from the Pacific.

Valvulina conica—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°*F.*		
16904	U.S.N.M.	10	D2003...	37 16 30 N.; 74 20 30 W..	641	....	....	Common.
16905	U.S.N.M.	3	D2018...	37 12 22 N.; 74 20 04 W..	788	39.0	bu. m.......	Few.
16906	U.S.N.M.	2	D2039...	38 19 26 N.; 68 20 20 W..	2,369	....	glob. oz......	Rare.
16907	U.S.N.M.	3	D2046...	40 02 49 N.; 68 49 00 W..	407	40.0	bu. m......	Few.
16909	U.S.N.M.	1	D2072...	41 53 00 N.; 66 35 00 W..	858	39.0	gy. m........	Rare.
16909	U.S.N.M.	7	D2110...	35 12 10 N.; 74 57 15 W..	516	40.0	bu. m.......	Common.
16910	U.S.N.M.	10	D2115...	35 49 30 N.; 74 34 45 W..	843	39.0	m. fne. s.....	Common.
16911	U.S.N.M.	2	D2171...	37 59 30 N.; 73 48 40 W..	444	39.5	gn. m.......	Rare.
16912	U.S.N.M.	7	D2172...	38 01 15 N.; 73 44 00 W..	568	39.0	gn. m.......	Common.
16913	U.S.N.M.	1	D2187...	39 49 30 N.; 71 10 00 W..	420	39.7	gn. m. s......	Rare.
16914	U.S.N.M.	1	D2234...	39 09 00 N.; 72 03 15 W..	810	38.6	gn. m.......	Rare.
16915	U.S.N.M.	3	D2262...	39 54 45 B.; 69 29 45 W..	250	41.6	gn. m. s.....	Rare.
16916	U.S.N.M.	8	D2377...	29 07 30 N.; 88 08 00 W..	210	67.0	gy. m.......	Common.
16917	U.S.N.M.	3	D2383...	28 32 00 N.; 88 06 00 W..	1,181	39.6	br. gn. m....	Rare.
16918	U.S.N.M.	1	D2399...	28 44 00 N.; 86 18 00 W..	196	51.6	gy. m.......	Rare.
16919	U.S.N.M.	1	D2547...	39 54 30 N.; 70 20 00 W..	390	39.6	gn. m.......	Rare.
16920	U.S.N.M.	3	D2573...	40 34 18 N.; 66 09 00 W..	1,742	37.3	gy. m. s......	Rare.
16921	U.S.N.M.	1	D2581...	39 43 00 N.; 71 34 00 W..	394	....	gn. m.......	Rare.
16922	U.S.N.M.	1	D2584...	39 05 30 N.; 72 23 20 W..	541	39.5	gy. m.......	Rare.
16923	U.S.N.M.	4	D2586...	39 02 40 N.; 72 40 00 W..	328	40.2	dk. gy. m....	Few.
16924	U.S.N.M.	1	D2729...	36 36 00 N.; 74 32 00 W..	679	....	dk. gn. m....	Rare.

VALVULINA FUSCA (Williamson).

Rotalina fusca Williamson, Rec. Foram. Great Britain, 1858, p. 55, pl. 5, figs. 114, 115.—Terquem, Ess. Anim. Plage Dunkerque, 1875, p. 26, pl. 2, figs. 6, *a*, *b*.

Valvulina fusca M. Sars, Vid. Selsk. Forh., 1868, p. 249.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 392, pl. 49, figs. 13, 14; Journ. Roy. Micr. Soc., 1887, p. 896.—Goës, Köngl. Svensk. Vet. Akad. Handl., vol. 25, No. 9, 1894, p. 39, pl. 8, figs. 353–355.—Wright, Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 472.—Robertson, Trans. Nat. Hist. Soc. Glasgow, vol. 3, pt. 3, 1892, p. 240.—Pearcey, Trans. Nat. Hist. Soc. Glasgow, vol. 2, 1890, p. 176.—Goës, Bull. Mus. Comp. Zoöl., vol. 29, 1896, p. 35.—Chapman, Journ. Linn. Soc. Zool., vol. 28, 1902, p. 400.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 2, 1911, p. 59, figs. 94–95.—Heron-Allen and Earland, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 58; Journ. Roy. Micr. Soc., 1916, p. 42; Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 232.—Mestayer, Trans. New Zealand Inst., vol. 48, 1916, p. 129.—Sidebottom, Journ. Roy. Micr. Soc. 1918, p. 24.—Cushman, Proc. U. S. Nat. Mus., vol. 56, 1919, p. 604; Bull. 100, U. S. Nat. Mus., vol. 4, 1921, p. 143, pl. 28, figs, 1*a*, *b*.

Description.—Test typically attached, low conical, depressed, rounded, the affixed end concave; chambers spirally arranged, with only three chambers in each whorl; wall finely arenaceous, smooth; aperture slit-like, at the inner basal margin of the chamber, protected by a valvular lip; early chambers reddish-brown, the later yellowish-brown; area of attachment light gray.

Diameter 0.50–0.65 mm.

Distribution.—About the British Isles at least this species is much more common than the preceding, but in the western Atlantic the reverse is true. Three are numerous records from off the shores of Scandinavia, the British Isles, Belgium, and France, Canary Islands, the Azores, and the West Indies (Brady). Heron-Allen and Earland record the species from two stations in the Clare Island region, off South Cornwall and at 11 stations off the west of Scotland. They note that it is most common in moderately deep water, and in their experience that it is rare in shallow dredgings off the British coast.

I have had it at but two *Albatross* stations, one off the northeastern coast of the United States, and the other south of Cuba.

Valvulina fusca—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
16894	U.S.N.M.	1	D2038...	38 30 30 N.; 69 08 25 W..	2,033	....	glob. oz.....	Rare.
16895	U.S.N.M.	2	D2160...	23 10 31 N.; 82 20 37 W..	167	....	co...........	Rare.

VALVULINA OVIEDOIANA d'Orbigny.

Plate 11, figs. 2–5.

Valvulina oviedoiana D'ORBIGNY, in De la Sagra, Hist. Fis. Pol. Nat. Cuba, 1839, "Foraminifères," p. 103, pl. 2, figs. 21, 22.—CUSHMAN, Proc. U. S. Nat. Mus., vol. 59, 1921, p. 51, pl. 11, figs. 11–14; Publ. 311, Carnegie Inst. Wash., 1922, p. 29, pl. 2, figs. 7, 8.

Verneuilina affixa CUSHMAN (part), Publ. 213, Carnegie Inst. Wash., 1918, pp. 271 *et seq.*

Description.—Test tetrahedral, triserial, flattened on three sides, apical end bluntly rounded, apertural end broadly rounded; chambers distinct, somewhat inflated, generally triangular, the ventral border broadly rounded; sutures distinct, somewhat depressed, wall coarsely arenaceous, somewhat roughened; aperture in a depressed area on the ventral side of the last-formed chamber with a large broad overhanging tooth; color white.

Length 1.0–1.5 mm.

Distribution.—D'Orbigny originally described this species from shore sands of Cuba. His name was not even used by Brady as a synonym in the *Challenger* Report, and the species has been entirely neglected since its first description, except that I have shown in a recent paper that it should be used for this common West Indies species of shallow water. I have had specimens from stations on the north coast of Jamaica at Montego Bay, and at Runaway Bay. As *Verneuilina affixa* I have recorded it from numerous stations off the coast of Florida and the Bahamas. In the *Albatross* material it has occurred in the Bahamas, off Yucatan, and at one station in the northern part of the Gulf of Mexico. It is a common and very well characterized species of this region. Its nearest ally seems to be *Valvulina davidiana* Chapman described by him from Funafuti.

This probably represents a Pacific species very closely allied to our West Indian one.

Valvulina oviedoiana—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
16897	U.S.N.M.	4	D2358...	20 19 00 N.; 87 03 30 W..	222	....	fne. wh. co..	Few.
16898	U.S.N.M.	1	D2388...	29 24 30 N.; 88 01 00 W..	35	....	yl. s. bk. sp.	Rare.
16899	U.S.N.M.	1	D2629...	23 48 40 N.; 75 10 40 W..	1,169	38.4	co. s.........	Rare.
16900	U.S.N.M.	5	....	Lisbon Creek Reef, Bahamas.	....	....	....	Few.

Genus CHRYSALIDINA d'Orbigny, 1846.

Chrysalidina D'ORBIGNY (type, *C. gradata* d'Orbigny), For. Foss. Vienne, 1846, p. 194.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 387.—CHAPMAN, The Foraminifera, 1902, p. 167.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 2, 1911, p. 60.

Description.—Test many chambered, triserial, at least in the early portion, tapering; apertures numerous, scattered over the terminal wall of the chamber; other walls also porous.

Three species of this genus are known, the type from the Cretaceous, another species *C. pulchella* Cushman, which I described from the Gatun Formation of the Panama Canal Zone, and the recent *C. dimorpha* H. B. Brady, which is a typically Indo-Pacific species, but which is recorded from the Atlantic. It is quite probable that the Cretaceous species is not generically the same as the last two, but further study is necessary to determine this.

CHRYSALIDINA DIMORPHA H. B. Brady.

Plate 19, fig. 4.

Chrysalidina dimorpha H. B. BRADY, Quart. Journ. Micr. Sci., vol. 21, 1881, p. 54; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 388, pl. 46, figs. 20, 21.—WOODWARD, Journ. New York Micr. Soc., 1885, p. 149.—EGGER, Abh. kön. bay. Akad. Wiss. München, Cl. 11, vol. 18, 1893, p. 274, pl. 6, figs. 47, 51, 52.—CHAPMAN, Proc. Zool. Soc. London, 1895, p. 20.—MILLETT, Journ. Roy. Micr. Soc., 1900, p. 12, pl. 1, fig. 14.—DAKIN, Rep. Ceylon Pearl-Oyster Fisheries, vol. 5, 1906, p. 233.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 2, 1911, p. 60, figs. 96–97 (in text); Bull. 100, U. S. Nat. Mus., vol. 4, 1921, p. 144.

Description.—Test free, elongate, tapering, triangular in cross section, the sides nearly equal, somewhat concave, the edges slightly carinate; early portion acute, consisting of chambers arranged triserially, the latter portion composed of chambers arranged in a single series; wall hyaline, perforate; apertures numerous on the broadened terminal face of the chamber.

Length about 0.50 mm., diameter about 0.25 mm.

Distribution.—Most of the records for this species seem to be from the Indo-Pacific, ranging from the Arabian Sea (Chapman) coral reefs of Honolulu, 40 fathoms (73 meters); Hongkong Harbor, 7 fathoms (13 meters); in dredged sand from Torres Strait, off Raine Island, 155 fathoms (283 meters); shore sands from the east coast of Madagascar; shallow water on the coast of Ceylon (Brady); coast of Mauritius, 411 and 374 meters (224 and 204 fathoms); off west Australia, 359 meters (196 fathoms) (Egger); Malay Archipelago (Millett), and Ceylon (Dakin). The only record hitherto for the Atlantic is that given by Woodward "Hamilton Harbor, Bermuda, 5 fathoms (9 meters)."

I have had two specimens of this species from *Albatross* station D2758 in 20 fathoms (37 meters) off the coast of Brazil. It seems to be very rare in the Atlantic, and it has not been found in any of the shallow-water material I have had from the coast of Florida or in the West Indies.

Brady mentions "a long, somewhat attenuated variety" which occurs in shallow water off Madagascar and Ceylon.

Chrysalidina dimorpha—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
16896	U.S.N.M.	2	D2758...	6 59 00 S.; 34 47 00 W..	20	79.0	brk. sh......	Rare.

Genus TRITAXIA Reuss, 1860.

Textularia (part) Reuss, Verst. Böhm. Kreid., pt. 1, 1845, p. 39.

Tritaxia Reuss (type, *T. tricarinata* (Reuss)=*Textularia tricarinata* Reuss), Sitz. Akad. Wiss. Wien, vol. 40, 1860, p. 228.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 388.—Chapman, The Foraminifera, 1902, p. 167.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 2, 1911, p. 61.

Description.—Test triserial, at least in the earlier portion, usually triangular in cross section; aperture central and terminal with or without a distinct neck and lip, rounded; wall usually arenaceous.

This genus as used by Reuss and later by Brady includes triserial forms which are "in their early development with a Textularian aperture, later becoming uniserial and the aperture circular and terminal." In this form they correspond somewhat to a triangular *Clavulina*. *Tritaxia caperata* H. B. Brady has been separated and forms the type of *Tritaxilina*.

The geological history of this genus apparently goes back to the lower Cretaceous. In the present ocean it seems to be largely confined to the Indo-Pacific region.

TRITAXIA LEPIDA H. B. Brady.

Tritaxia lepida H. B. BRADY, Quart. Journ. Micr. Soc., vol. 21, 1881, p. 55; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 389, pl. 49, figs. 12*a*, *b*.—MILLETT, Journ. Roy. Micr. Soc., 1900, p. 12, pl. 1, fig. 15.—HERON-ALLEN and EARLAND, Journ. Roy. Micr. Soc., 1908, p. 328.

Description.—"Test triquetrous, elongate, broadest near the middle, tapering to a point at the aboral extremity, distal and rounded; the three sides nearly equal, the angles sharp or subcarinate; texture hyaline, aperture simple, consisting of a short tubular neck with thickened lip, at the center of the terminal segment."

"Length, 1/80th inch (0.3 mm.)."

Distribution.—Brady described this species from *Challenger* station 45, off the coast of North America, a little south of the latitude of New York, at a depth of 1,240 fathoms (2,268 meters). This is the only recent Atlantic record for this species. Millett records it from a single station, and a single specimen from the Malay Archipelago, and also records specimens from *Challenger* station 185 off Raine Island, Torres Strait, 155 fathoms (283 meters). A comparison of the figures given by Brady and that of Millett show considerable difference in the two and it is probable that a further examination of the specimens from the two areas will show that the one from the Pacific is distinct.

Genus GAUDRYINA d'Orbigny, 1839.

Gaudryina D'ORBIGNY (type, *G. rugosa* d'Orbigny), in De la Sagra, Hist. Fis. Pol. Nat. Cuba, 1839, "Foraminifères," p. 109; Mém. Soc. Géol. France, ser. 1, vol. 4, 1840, p. 43; For. Foss. Vienne, 1846, p. 197.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 377.—CHAPMAN, The Foraminifera, 1902, p. 170.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 2, 1911, p. 62.
Heterostomella REUSS, Sitz. Akad. Wiss. Wien, vol. 52, pt. 1, 1865, p. 448.

Description.—Test free, composed of two distinct portions, the earlier consisting of a series of chambers arranged triserially, followed by a later consisting of a series arranged biserially; wall arenaceous, varying much in coarseness in the different species; aperture variable as in the various species of *Textularia*, either an opening at the base of the inner margin of the chamber, between it and the wall of the preceding chamber, or a perforation near the base of the inner margin, often with a raised border, or in some species a terminal more or less circular opening.

The genus *Gaudryina* is evidently derived through triserial ancestors such as *Verneuilina*. Its later biserial development which is very similar to that of *Textularia* in arrangement to chambers and aperture is due to a reversion in its later development. There is some difference in the apertural characters in the different species, some being entirely *Textularia*-like, others being terminal. The genus is known geologically from the lower Cretaceous to the present and there is evidently much difference in the species in the different geological periods and a uniting of the recent forms with those of the earlier fossil forms as has been done by some authors does not seem to be the best treatment of the recent species.

A study of the *Albatross* and other material from the western Atlantic shows that our species and varieties are constant in their characters and have very definite areas of distribution which follow those of other species of the foraminifera.

GAUDRYINA SCABRA H. B. Brady.

Plate 11, figs. 6, 7.

Gaudryina pupoides H. B. Brady (not *G. pupoides* d'Orbigny, 1840), Ann. Mag. Nat. Hist., ser. 4, vol. 6, 1870, p. 300, pl. 8, fig. 5.

Gaudryina scabra H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 381, pl. 46, fig. 7.—Cushman, Bull. 100, U. S. Nat. Mus., vol. 4, 1921, p. 146, pl. 28, fig. 5.

Description.—Test elongate, tapering, somewhat compressed, increasing in breadth from the subacute apical end to the much broader apertural end, triserial portions short but distinct, rounded, biserial portion broadly elliptical in transverse section; chambers in the biserial portion usually consisting of about five pairs, slightly inflated, distinct; sutures distinct, slightly depressed, wall rather coarsely arenaceous with numerous broken sponge spicules and a considerable portion of cement; aperture at the base of the inner margin of the chamber, arched, simple; color deep reddish-brown.

Length up to 2 mm.

Distribution.—From the *Challenger* material Brady records this species from but two stations; 23, 450 fathoms (823 meters), latitude 18° 26′ N., longitude 63° 29′ W., and 24, 390 fathoms (713 meters), latitude 18° 38′ 30″ N., longitude 65° 05′ 30″ W. This species has been widely recorded by numerous authors, but an examination of their figures when given show that very few of these are at all like the typical specimens figured and described by Brady from the West Indies. An examination of the abundant western Atlantic material has been surprising in that *Gaudryina scabra* has occurred but twice, once at *Albatross* station D2751, 687 fathoms (1,256 meters), close to the two *Challenger* stations given by Brady. There are also two specimens from *Albatross* station D2150, in 382 fathoms (697 meters) in the Caribbean Sea. This therefore seems to be a species developed in the Caribbean and possibly adjacent areas in water of several hundred fathoms in depth, and so far as material shows is confined to this region.

Gaudryina scabra—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
16699	U.S.N.M.	2	D2150...	134 34 45 N.; 81 21 10 W.	382	45.8	wh. crs. s....	Rare.
16700	U.S.N.M.	2	D2751...	16 54 00 N.; 63 12 00 W.	687	40.0	bu. glob. oz..	Rare.

GAUDRYINA FLINTII Cushman.

Plate 12, figs. 1, 2.

Gaudryina subrotundata Flint (not *G. subrotundata* Schwager, 1866), Rep. U. S. Nat. Mus., 1897 (1989), p. 287, pl. 33, fig. 1.

Gaudryina rugosa Göes (not *G. rugosa* d'Orbigny, 1840), Bull. Mus. Comp. Zoöl., vol. 29, 1896, p. 39.

Gaudryina flintii Cushman, Bull. 71, U. S. Nat. Mus., pt. 2, 1911, p. 63, figs. 102*a–c* (in text); Bull. 100, U. S. Nat. Mus., vol. 4, 1921, p. 146, pl. 29, fig. 1.

Description.—Test subcylindrical, gradually tapering to the initial end, the early triserial portion forming but a small part of the test, the later biserial portion making up fully three-fourths; chambers of the later portion well rounded, nearly circular in cross section; sutures well marked, wall arenaceous, usually rather coarse, but in some cases finer and more smoothly finished; aperture in the biserial portion a subcircular opening near, but not connecting with the inner border of the chamber; color gray.

Length 1–5 mm.

Distribution.—This species described in an earlier paper on the Pacific foraminifera occurs also in the Atlantic. Flint had this from off the coast of South America, off Brazil, from the region south of Yucatan, off the Windward Islands, in the Gulf of Mexico, and off the coast of Georgia. Except that I have not had it from off the coast of Brazil, I have had it from all the other regions from which Flint records it. It is interesting also to note that Brady records *G. subrotundata* from *Challenger* stations 23 and 24 off the Lesser Antilles, close to the stations from which Flint and I have had this species. The distribution of *G. flintii* in the Atlantic then follows very definitely the distribution of so many species found in the Atlantic, southward from Cape Hatteras, in the Gulf of Mexico and the Caribbean and on the eastern coast of Brazil.

Gaudryina flintii—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
16723	U.S.N.M.	1	D2355...	20 56 48 N.; 86 27 00 W..	399	....	yl. oz.......	Rare.
16724	U.S.N.M.	1	D2383...	28 32 00 N.; 88 06 00 W..	1,181	39.6	br. gn. m....	Rare.
16725	U.S.N.M.	10	D2385...	28 51 00 N.; 88 18 00 W..	730	40.1	gy. m.......	Common.
16726	U.S.N.M.	2	D2677...	32 39 00 N.; 76 50 30 W..	478	39.3	gn. m.......	Rare.
16727	U.S.N.M.	3	D2678...	32 40 00 N.; 76 40 30 W..	731	38.7	lt. gy. oz....	Few.
16728	U.S.N.M.	1	D2679...	32 40 00 N.; 76 40 30 W..	782	38.6	lt. gy. oz....	Rare.
16729	U.S.N.M.	2	D2751...	16 54 00 N.; 63 12 00 W..	687	40.0	bu. glob., oz.	Rare.

GAUDRYINA ATLANTICA (Bailey).

Plate 13, figs. 1–3.

Textularia atlantica Bailey, Smithsonian Contrib., vol. 2, art. 3, 1851, p. 12, pl., figs. 38–43.

Gaudryina rugosa Flint, Rep. U. S. Nat. Mus., 1897 (1899), p. 288, pl. 33, fig. 3.

Verneuilina triquetra Goës (not Münster), Bull. Mus. Comp. Zoöl., vol. 29, 1896, p. 38.

Description.—Test elongate, triangular in section, the angles acute, triserial portion short, biserial portion mostly triangular, the last-formed one or two chambers often rounded, tapering gradually from the blunt initial end to the broadly rounded apertural end; chambers distinct, not inflated; sutures distinct throughout, wall coarsely arenaceous, of angular sand grains with a large proportion of whitish cement, surface rather smoothly finished; aperture elongate, slightly arched, in a deep reentrant of the ventral inner border of the chamber; color light gray.

Length up to 4 and 5 mm., usually less.

Distribution.—Bailey described this species from a station in 89 fathoms (162 meters), latitude 39° 31′ N., longitude 72° 11′ 20″ W. At this station this species "is particularly abundant." Specimens of this species are abundant at a group of *Albatross* stations off the northeastern coast of the United States in the immediate vicinity of the type station given by Bailey, and at one other station off Cape Hatteras. At some of these *Albatross* stations this species was very abundant. This differs from *G. rugosa* d'Orbigny, as a reference to his figures will show.[18]

Gaudryina atlantica—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
16659	U.S.N.M.	8	D2244...	40 05 15 N.; 70 23 00 W..	67	52.9	gn. m.......	Common.
16660	U.S.N.M.	10	D2245...	40 01 15 N.; 70 20 30 W..	122	48.8	gn. m.......	Common.
16661′	U.S.N.M.	10	D2247...	40 03 00 N.; 69 57 00 N...	67	52.4	gn. m. bk. sp	Common.
16662	U.S.N.M.	10	D2314...	32 43 00 N.; 77 51 00 W..	159	47.4	crs. s. bk. sp.	Common.
16663	U.S.N.M.	10	D2377...	29 07 30 N.; 88 08 00 W..	210	67.0	gy. m.......	Common.
16664	U.S.N.M.	4	D2399...	28 44 00 N.; 86 18 00 W..	196	51.6	gy. m.......	Few.§
16665	U.S.N.M.	3	D2542...	40 00 15 N.; 70 42 20 W..	129	47.2	s. brk. sh....	Few.
16666	U.S.N.M.	1	D2544...	40 01 45 N.; 70 24 00 W..	131	47.7	gn. s. bk. sp.	Rare.
16667	U.S.N.M.	10	....	Key West, Fla..........	78	....	....	Common.
			Fish Hawk.					
16668	U.S.N.M.	3	949......	40 03 00 N.; 70 31 00 W..	100	52.0	yl. m........	Few.
16669	U.S.N.M.	1	1108.....	40 02 00 N.; 70 37 30 W..	101	48.0	gy. m. fn. s..	Rare.
16670	U.S.N.M.	1	1038.....	38 58 00 N.; 70 06 00 W..	146	47.0	s. sh	Rare.

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[18] Mem. Soc. Geol. France, vol. 4, 1840, pl. 4, figs. 20, 21.

GAUDRYINA cf. G. CONVEXA Cushman.

Plate 8, fig. 5.

Gaudryina convexa Cushman, Bull. 71, U. S. Nat. Mus., pt. 2, 1911, p. 66, figs. 105*a–c* (in text).

There are single specimens from two *Albatross* stations, D2639 in 56 fathoms (102 meters) and D2641 in 60 fathoms (110 meters), both off Florida, which are very close to this species, which I described from the western Pacific in Korean Strait. Except that the triangular portion occupies a larger portion of the test, the specimens from Florida are very similar to the others.

Gaudryina cf. G. convexa—Material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
17157	U.S.N.M.	1	D2639...	25 04 50 N.; 80 15 00 W..	56	....	co. s.........	Rare.
17158	U.S.N.M.	1	D2641...	25 11 30 N.; 80 10 00 W..	60	69.2	co. s.........	Rare.

GAUDRYINA CURTA, new species.

Plate 14, figs. 1–4.

Description.—Test short and broad, tapering, slightly compressed in the later portion, ends bluntly rounded, triserial portion composed of several chambers making up about one-third of the test, later two-thirds made up usually of four rotund chambers in a triserial arrangement; chambers few, inflated, distinct; sutures distinct, depressed, especially in the later portion, wall coarsely arenaceous, composed of angular sand grains and an abundant cement of finer material, surface smoothly finished; aperture rounded, at the edge of the ventral side at the inner margin of the chamber, the sides continued on the preceding chamber; color reddish-brown.

Length 2.0–2.5 mm.

Distribution.—Type-specimen (U.S.N.M. No. 16698) from *Albatross* station D2739, 958 fathoms (1,752 meters), eastern coast of the United States. Very typical specimens of this species, often abundant, have occurred at a number of stations from the region of Cape Hatteras north to the Gulf of St. Lawrence, in the cold water off this coast. It is a very different species from *Gaudryina scabra* H. B. Brady in its much shorter, rotund form, and in its fewer chambers. It is perhaps nearest to *Gaudryina paupercula* Cushman from the Pacific, but that species has a still shorter fewer-chambered form, and especially in the triserial portion is different, being compressed where *G. curta* is very rounded.

Gaudryina curta—*Material examined.*

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
16684	U.S.N.M.	1	D2046...	40 02 49 N.; 68 49 00 W..	407	40.0	bu. m.......	Rare.
16685	U.S.N.M.	1	D2111...	35 09 50 N.; 74 57 40 W..	938	....	gn. m.......	Rare.
16686	U.S.N.M.	6	D2171...	37 59 30 N.; 73 48 40 W..	444	39.5	gn. m.......	Few.
16687	U.S.N.M.	3	D2172...	38 01 15 N.; 73 44 00 W..	568	39.0	gn. m.......	Few.
16688	U.S.N.M.	10	D2203...	39 34 15 N.; 71 41 15 W..	705	38.9	gn. m. s.....	Common.
16689	U.S.N.M.	1	D2204...	39 30 30 N.; 71 44 30 W..	728	39.1	br. m.......	Rare.
16690	U.S.N.M.	1	D2234...	39 09 00 N.; 72 03 15 W..	810	38.6	gn. m.......	Rare.
16691	U.S.N.M.	2	D2504...	44 23 00 N.; 61 22 45 W..	82	40.6	bk. m. g....	Rare.
16692	U.S.N.M.	10	D2547...	39 54 30 N.; 70 20 00 W..	390	39.6	gn. m.......	Common.
16693	U.S.N.M.	4	D2677...	32 39 00 N.; 76 50 30 W..	478	39.3	gn. m.......	Few.
16694	U.S.N.M.	10	D2678...	32 40 00 N.; 76 40 30 W..	731	38.7	lt. gy. oz.....	Common.
16695	U.S.N.M.	1	D2679...	32 40 00 N.; 76 40 30 W..	782	38.6	lt. gy. oz....	Rare.
16696	U.S.N.M.	2	D2682...	39 38 00 N.; 70 22 00 W..	990	....	gn. m.......	Rare.
16697	U.S.N.M.	1	D2731...	36 45 00 N.; 74 28 00 W..	781	....	gy. oz.......	Rare.
16698	U.S.N.M.	10	D2739...	37 34 30 N.; 73 58 00 W..	811	38.2	gy. m.......	Common.

GAUDRYINA RUDIS J. Wright.

Plate 12, figs. 3–6.

Gaudryina rudis J. WRIGHT, Irish Nat., vol. 9, 1900, p. 53, pl. 2, fig. 1.—HERON-ALLEN and EARLAND, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 58, pl. 3, figs. 14–17; Journ. Roy. Micr. Soc., 1916, p. 42; Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 232.

Distribution.—Wright described this species from off the southwest of Ireland, from stations ranging in depth from tide-mark down to 110 fathoms (200 meters), frequent off Belfast Lough, 30 to 60 fathoms (55 to 110 meters), and common in the shore sands of Dog's Bay, Connemara Island. Heron-Allen and Earland record the species from 29 stations in the Clare Island region off western Ireland and add the following: "west coast of Scotland (shallow water), at several Welsh stations, and also in the Orkneys and in the Moray Firth on the east coast, but it does not appear to have been found in the English Channel or in the English North Sea." They also record it as very rare off South Cornwall and from 14 stations west of Scotland. The species is not known outside of this general region of the British Isles.

GAUDRYINA APICULARIS Cushman.

Plate 8, fig. 4.

Gaudryina siphonella H. B. BRADY (not *G. siphonella* Reuss, 1851), Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 382, pl. 46, figs. 17–19.—FLINT, Rep. U. S. Nat. Mus., 1897 (1899), p. 288, pl. 34, fig. 2.—SIDEBOTTOM, Journ. Roy. Micr. Soc., 1918, p. 23.

Gaudryina apicularis CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 2, 1911, p. 69, figs. 110*a*, *b* (in text); Bull. 100, U. S. Nat. Mus., vol. 4, 1921, p. 151, pl. 29, fig. 7.

Description.—Test elongate, triserial portion consisting of few chambers, forming usually somewhat less than half the test, later portion biserial, the chambers inflated and distinct, the later chambers with a forward extension, at the end of which is the aperture; wall rather coarsely arenaceous and slightly rough; aperture nearly circular, at the end of the elongate chamber; color reddish-brown.

Length up to 1 mm.

Distribution.—From the available records this species is widely distributed in usually comparatively deep water. Brady's records in the *Challenger* report include the North and South Atlantic and the North and South Pacific. Several distinct forms have been included under the name *G. siphonella* Reuss as is shown by a reference to the published figures of Brady, Millett, Sidebottom, and others. The only record given by Flint is *Albatross* station D2568 in 1,781 fathoms (3,257 meters), off the northeastern coast of the United States. The only one of Brady's *Challenger* records which comes into our region is station 24, off the Lesser Antilles, in 390 fathoms (713 meters), and one off the coast of Brazil in 675 fathoms (1,234 meters). I have had specimens from 13 stations, ranging from latitude 40° off our northeastern coast southward to the coast of Georgia, and 4 stations in the northern part of the Gulf of Mexico, one off Yucatan, one off the Windward Islands, and one off the coast of Brazil. These specimens are all very constant in their characters and resemble very much plate 46, figure 17, as given by Brady, and the same as those figured by Flint. They are made up of rather coarse arenaceous material and are slightly roughened on the surface.

Gaudryina apicularis—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
16671	U.S.N.M.	1	D2041...	39 22 50 N.; 68 25 00 W..	1608	38.0	glob. oz.....	Rare.
16672	U.S.N.M.	1	D2093...	39 42 50 N.; 71 01 20 W..	1000	39.0	for. s. m.....	Rare.
16673	U.S.N.M.	1	D2355...	20 56 48 N.; 86 27 00 W..	399	....	yl. oz.......	Rare.
16674	U.S.N.M.	1	D2372...	29 15 30 N.; 85 29 30 W..	27	67.0	gy. m.......	Rare.
16675	U.S.N.M.	1	D2381...	28 05 00 N.; 87 56 15 W..	1330	....	lt. br. m....	Rare.
16676	U.S.N.M.	2	D2383...	28 32 00 N.; 88 06 00 W..	1181	39.6	br. gn. m...	Rare.
16677	U.S.N.M.	1	D2393...	28 43 00 N.; 87 14 30 W..	525	41.1	lt. gy. m....	Rare.
16678	U.S.N.M.	2	D2568...	39 15 00 N.; 68 08 00 W..	1781	36.9	gy. oz.......	Rare.
16679	U.S.N.M.	2	D2572...	40 29 00 N.; 66 04 00 W..	1769	37.8	gy. oz.......	Rare.
16680	U.S.N.M.	3	D2677...	32 39 00 N.; 76 50 30 W..	478	39.3	gn. m.......	Few.
16681	U.S.N.M.	2	D2679...	32 40 00 N.; 76 40 30 W..	782	38.6	lt. gy. oz....	Rare.
16682	U.S.N.M.	3	D2761...	15 39 00 S.; 38 32 54 W..	818	39.0	pter. oz.....	Few.
16683	U.S.N.M.	1	H86.....	12 58 40 N.; 62 48 00 W..	1635	....	bu. m. for...	Rare.

GAUDRYINA BRADYI Cushman.

Plate 12, fig. 8.

Gaudryina pupoides H. B. BRADY (not *G. pupoides* d'Orbigny), Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 378, pl. 46, figs. 1–4.—H. B. BRADY, PARKER, and JONES, Trans. Zool. Soc. London, vol. 12, 1888, p. 219, pl. 43, figs. 7, 8.—WRIGHT, Ann. Mag. Nat. Hist., ser. 6, vol. 4, 1889, p. 448.—PEARCEY, Trans. Nat. Hist. Soc. Glasgow, vol. 2, 1890, p. 176.—WRIGHT, Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 471.—CHAPMAN, Proc. Zool. Soc. London, 1895, p. 20.—GOËS, Bull. Mus. Comp. Zoöl., vol. 29, 1896, p. 40.—FLINT, Ann. Rep. U. S. Nat. Mus., 1897 (1899), p. 287, pl. 32, fig. 4.—CHAPMAN, Journ. Linn. Soc. London, vol. 30, 1910, p. 403; Zool. Res. *Endeavour*, pt. 3, 1912, p. 310; vol. 3, pt. 1, 1915, p. 16.—SIDEBOTTOM, Journ. Roy. Micr. Soc., 1918, p. 23.

Gaudryina bradyi CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 2, 1911, p. 67, figs. 107*a–c* (in text).—PEARCEY, Trans. Roy. Soc. Edinburgh, vol. 49, 1914, p. 1014.—CUSHMAN, Bull. 100, U. S. Nat. Mus., vol. 4, 1921, p. 149, pl. 29, fig. 3.

Description.—Test stout, somewhat elongate, tapering slightly until near the initial end where it tapers abruptly to the somewhat blunt end; triserial portion nearly circular in cross section, of few chambers, the later biserial portion making up about three-fourths of the test, slightly compressed; chambers overlapping and appearing crowded, broadly elliptical in cross section, inflated; suture deep and distinct, end strongly convex, wall of fine arenaceous or calcareous shell material, smooth; aperture oval, slightly back from the inner margin of the chamber and with the border raised somewhat and thickened; color light gray.

Length 0.38–1.00 mm.

Distribution.—This recent species is very widely distributed, being one of the few Textulariidae associated with typical *Globigerina*-ooze. It is very widely distributed all over the world and shows little if any variation. It has proved to be one of the most common species of the genus in the material I have examined from the western Atlantic, being found abundantly off the entire eastern coast of the United States, in the Gulf of Mexico, and in the Caribbean Sea. *Challenger* stations show it is distributed generally over both the South and North Atlantic.

Gaudryina bradyi—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
16755	U.S.N.M.	1	D2029...	39 42 00 N.; 70 47 00 W..	1,168	38.5	gy. m.......	Rare.
16756	U.S.N.M.	1	D2035...	39 26 16 N.; 70 02 37 W..	1,362	....	glob. oz.....	Rare.
16757	U.S.N.M.	1	D2036...	38 52 40 N.; 69 24 40 W..	1,735	38.0	glob. oz.....	Rare.
16758	U.S.N.M.	5	D2037...	38 53 00 N.; 69 23 30 W..	1,731	38.0	glob. oz.....	Few.
16759	U.S.N.M.	3	D2038...	38 30 30 N.; 69 08 25 W..	2,033	....	glob. oz.....	Few.
16760	U.S.N.M.	7	D2041...	39 22 50 N.; 68 25 00 W..	1,608	38.0	glob. oz.....	Common.
16761	U.S.N.M.	4	D2043...	39 49 00 N.; 68 28 30 W..	1,467	38.5	glob. oz.....	Few.
16762	U.S.N.M.	1	D2046...	40 02 49 N.; 68 49 00 W..	407	40.0	bu. m.......	Rare.
16763	U.S.N.M.	2	D2050...	39 42 50 N.; 69 21 20 W..	1,050	44.5	glob. oz.....	Rare.
16764	U.S.N.M.	2	D2052...	39 40 05 N.; 69 21 25 W..	1,098	45.0	glob. oz.....	Rare.
16765	U.S.N.M.	2	D2076...	41 13 00 N.; 66 00 50 W..	906	....	bu. m.......	Rare.
16766	U.S.N.M.	2	D2097...	37 56 20 N.; 70 57 30 W..	1,917	....	glob. oz.....	Rare.
16767	U.S.N.M.	1	D2117...	15 24 20 N.; 63 31 30 W..	683	39.8	yl. m. fne. s.	Rare.
16768	U.S.N.M.	5	D2144...	9 49 00 N.; 79 31 30 W..	896	....	gn. m.......	Few.
16769	U.S.N.M.	10	D2150...	13 34 45 N.; 81 21 10 W..	382	45.8	wh. crs. s....	Common.
16770	U.S.N.M.	2	D2160...	23 10 31 N.; 82 20 37 W..	167	....	co..........	Rare.
16771	U.S.N.M.	1	D2196...	39 35 00 N.; 69 44 00 W..	1,230	38.0	gn. m.......	Rare.
16772	U.S.N.M.	9	D2202...	39 38 00 N.; 71 39 45 W..	515	39.1	gn. m.......	Common.
16773	U.S.N.M.	2	D2203...	39 34 15 N.; 71 41 15 W..	705	38.9	gn. m., s....	Rare.
16774	U.S.N.M.	1	D2204...	39 30 30 N.; 71 44 30 W..	728	39.1	br. m.......	Rare.
16775	U.S.N.M.	1	D2212...	39 59 30 N.; 70 30 45 W..	428	40.0	gn. m.......	Rare.
16776	U.S.N.M.	5	D2217...	39 47 20 N.; 69 34 15 W..	924	38.1	gy. m.......	Few.
16777	U.S.N.M.	1	D2231...	38 29 00 N.; 73 09 00 W..	965	36.8	gy. oz.......	Rare.
16778	U.S.N.M.	5	D2335...	23 10 39 N.; 82 20 21 W..	204	....	....	Few.
16779	U.S.N.M.	1	D2385...	28 51 00 N.; 88 18 00 W..	730	40.1	gy. m.......	Rare.
16780	U.S.N.M.	1	D2392...	28 47 30 N.; 87 27 00 W..	724	40.7	br. gy. m....	Rare.
16793	U.S.N.M.	2	D2393...	28 43 00 N.; 87 14 30 W..	525	41.1	lt. gy. m	Rare.
16781	U.S.N.M.	2	D2394...	28 38 30 N.; 87 02 00 W..	420	41.8	gn. m.......	Rare.
16782	U.S.N.M.	1	D2395...	28 36 15 N.; 86 50 00 W..	347	44.1	gy. m.......	Rare.
16783	U.S.N.M.	2	D2396...	28 34 00 N.; 86 48 00 W..	335	....	gy. m.......	Rare.
16784	U.S.N.M.	8	D2399...	28 44 00 N.; 86 18 00 W..	196	51.6	gy. m.......	Common.
16785	U.S.N.M.	3	D2400...	28 41 00 N.; 86 07 00 W..	169	....	gy. m.......	Few.
16786	U.S.N.M.	1	D2416...	31 26 00 N.; 79 07 00 W..	276	53.8	co. brk. sh...	Rare.
16787	U.S.N.M.	1	D2528...	41 47 00 N.; 65 37 30 W..	677	38.7	br. s........	Rare.
16788	U.S.N.M.	1	D2530...	40 53 30 N.; 66 24 00 W..	956	38.4	gy. oz.......	Rare.
16789	U.S.N.M.	1	D2547...	39 54 30 N.; 70 20 00 W..	390	39.6	gn. m.......	Rare.
16790	U.S.N.M.	1	D2550...	39 44 30 N.; 70 30 45 W..	1,081	38.5	br. m.......	Rare.
16791	U.S.N.M.	2	D2562...	39 15 30 N.; 71 25 00 W..	1,434	37.3	gy. oz.......	Rare.
16792	U.S.N.M.	2	D2564...	39 22 00 N.; 71 23 30 W..	1,390	37.3	gy. oz.......	Rare.
16805	U.S.N.M.	5	D2573...	40 34 18 N.; 66 09 00 W..	1,742	37.3	gy. m. s.....	Few.
16794	U.S.N.M.	1	D2581...	39 43 00 N.; 71 34 00 W..	394	....	gn. m.......	Rare
16795	U.S.N.M.	1	D2585...	39 08 30 N.; 72 17 00 W..	542	39.0	dk. gy. m....	Rare.
16796	U.S.N.M.	1	D2614...	34 09 00 N.; 76 02 00 W..	168	....	gy. s. bk. sp.	Rare.
16797	U.S.N.M.	1	D2629...	23 48 40 N.; 75 10 40 W..	1,169	38.4	co. s........	Rare.
16798	U.S.N.M.	1	D2660...	28 40 00 N.; 78 46 00 W..	504	45.7	yl. for.......	Rare.
16799	U.S.N.M.	1	D2679...	32 40 00 N.; 76 40 30 W..	782	38.6	lt. gy. oz....	Rare.
16800	U.S.N.M.	2	D2684...	39 35 00 N.; 70 54 00 W..	1,106	....	br. c. bk. sp.	Rare.
16801	U.S.N.M.	2	D2689...	39 42 00 N.; 71 15 30 W..	525	....	gn. m.......	Rare.
16802	U.S.N.M.	5	D2713...	38 20 00 N.; 70 08 30 W..	1,859	....	br. oz.......	Few.
16803	U.S.N.M.	4	D2721...	38 56 00 N.; 72 11 30 W..	813	....	gy. oz.......	Few.
16804	U.S.N.M.	2	H133....	11 33 20 N.; 66 19 00 W..	533	....	gy. m. for...	Rare.
	J. A. C...	1	*Flying Falcon.* Log 8...	51 02 00 N.; 11 27 00 W..	345	....	....	Rare.

GAUDRYINA BACCATA Schwager, var. NOVANGLIAE, new variety.

Plate 13, fig. 4.

Gaudryina baccata SCHWAGER, *Novara*-Exped., Geol. Theil, p. 2, 1866, p. 200, pl. 4, figs. 12*a*, *b*.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 379, pl. 46, figs. 8-11.—PEARCEY, Trans. Nat. Hist. Soc. Glasgow, vol. 2, 1890, p. 176.—CHAPMAN, Proc. Zool. Soc. London, 1895, p. 20.—FLINT, Ann. Rep. U. S. Nat. Mus., 1897 (1899), p. 287, pl. 32, fig. 5.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 2, 1911, p. 68, figs. 108*a*, *b* (in text).—SIDEBOTTOM, Journ. Roy. Micr. Soc., 1918, p. 23.

Description.—Test elongate, tapering gradually to the somewhat acute initial end; early portion composed of triserially arranged chambers with rounded angles and forming the lesser portion of the test; later portion biserial, often somewhat irregular, wall arenaceous, of fine material and smoothly finished; aperture elongate, somewhat back from the inner margin of the chamber and often with a raised border; color gray.

Length up to 3 mm.

Distribution.—Type-specimen (U.S.N.M. No. 16710) from *Albatross* station D2105, 1,395 fathoms (2,542 meters). This species described by Schwager from Kar Nicobar was recorded by Brady from seven stations in the North Atlantic at depths of 290 to 1,750 fathoms (530 to 3,200 meters), and one in the South Atlantic in 1,900 fathoms (3,475). Additional stations were two from the South Pacific and one in the North Pacific. In my material from the North Pacific I failed to find this species and the only other Pacific record is that of Sidebottom quoted above. As it does not occur in any of Chapman's records from the Australian or general Indo-Pacific region, it certainly seems as though its distribution in the South Pacific is either very limited or the recorded specimens may not be typical of this species.

In the North Atlantic, except for the *Challenger* stations and the single record of Pearcey from the Faroe Channel it is not recorded. Heron-Allen and Earland fail to record it in their various papers on the foraminifera in the region of the British Isles. The three *Challenger* stations, for which definite references are given in the North Atlantic are in a line southeast from the region of New York. All but one of the twenty stations from which I have had this species are in this same general region as are also two of Flint's stations. Its concentration of records in this particular area seem to indicate that we have here a variety very limited in its distribution. A comparison of the figures given by Schwager and those of Brady and Flint also seem to indicate that this is not identical with the species described by Schwager. Schwager's measurements, eight-tenths of a millimeter, show that his specimens were very much smaller than those of 2 and 3 millimeters, obtained off our eastern coast.

I have placed this form as a variety of Schwager's species, and it may later prove to be distinct.

Gaudryina baccata, var. novangliae—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°*F*.		
16701	U.S.N.M.	5	D2003	37 16 30 N.; 74 20 36 W	641			Few.
16702	U.S.N.M.	2	D2037	38 53 00 N.; 69 23 30 W	1,731	38.0	glob. oz	Rare.
16703	U.S.N.M.	1	D2038	38 30 30 N.; 69 08 25 W	2,033		glob. oz	Rare.
16704	U.S.N.M.	1	D2039	38 19 26 N.; 68 20 20 W	2,369		glob. oz	Rare.
16705	U.S.N.M.	2	D2041	39 22 50 N.; 68 25 00 W	1,608	38.0	glob. oz	Rare.
16706	U.S.N.M.	2	D2042	39 33 00 N.; 68 26 45 W	1,555	38.5	glob. oz	Rare.
16707	U.S.N.M.	2	D2043	39 49 00 N.; 68 28 30 W	1,467	38.5	glob. oz	Rare.
16708	U.S.N.M.	1	D2048	40 02 00 N.; 68 50 30 W	547	39.0	crs. sm. g	Rare.
16709	U.S.N.M.	1	D2052	39 40 05 N.; 69 21 25 W	1,098	45.0	glob. oz	Rare.
16710	U.S.N.M.	2	D2105	37 50 00 N.; 73 03 50 W	1,395	41.0	glob. oz	Rare.
16711	U.S.N.M.	1	D2180	39 49 30 N.; 70 26 00 W	600	39.7	gn. m. s	Rare.
16712	U.S.N.M.	1	D2221	39 05 30 N.; 70 44 30 W	1,525	36.9	gy. oz	Rare.
16713	U.S.N.M.	1	D2383	28 32 00 N.; 88 06 00 W	1,181	39.6	br. gn. m	Rare.
16714	U.S.N.M.	2	D2550	39 44 30 N.; 70 30 45 W	1,081	38.5	br. m	Rare.
16715	U.S.N.M.	2	D2562	39 15 30 N.; 71 25 00 W	1,434	37.3	gy. oz	Rare.
16716	U.S.N.M.	1	D2563	39 18 30 N.; 71 23 30 W	1,422	37.4	gy. oz	Rare.
16717	U.S.N.M.	1	D2564	39 22 00 N.; 71 23 30 W	1,390	37.3	gy. oz	Rare.
16718	U.S.N.M.	2	D2581	39 43 00 N.; 71 34 00 W	394		gn. m	Rare.
16719	U.S.N.M.	2	D2584	39 05 30 N.; 72 23 20 W	541	39.5	gy. m	Rare.
16720	U.S.N.M.	1	D2682	39 38 00 N.; 70 22 00 W	990		gn. m	Rare.
16721	U.S.N.M.	1	D2689	39 42 00 N.; 71 15 30 W	525		gn. m	Rare.
16722	U.S.N.M.	3	D2706	41 28 30 N.; 65 35 30 W	1,188		gy. oz. for	Few

GAUDRYINA CHILOSTOMA (Reuss).

Plate 12, fig. 7.

Textilaria chilostoma Reuss, Zeitschr. deutsch. geol. Ges., vol. 4, 1852, p. 1.

Gaudryina chilostoma Reuss, Denkschr. Akad. Wiss. Wien, vol. 25, 1866, p. 120, pl. 1, fig. 5.—Fornasini, Mem. Accad. Sci. Bologna, ser. 5, vol. 3, 1893, p. 197, pl. 1, figs. 6–8.—Goës, Köngl. Svensk. Vet. Akad. Handl., vol. 25, No. 9, 1894, p. 34, pl. 7, figs. 278–280; Bull. Mus. Comp. Zoöl. 29, 1896, p. 41.—Cushman, Bull. 100, U. S. Nat. Mus., vol. 4, 1921, p. 150.

audryina pupoides d'Orbigny, var. *chilostoma* H. B. Brady, Rep. Voy. *Challenger*, Zoology. vol. 9, 1884, p. 379, pl. 46, figs. 5, 6.—H. B. Brady, Parker and Jones, Trans. London, vol. 12, 1888, p. 219, pl. 42, fig. 9.—Sidebottom, Journ. Zool. Soc. Roy. Micr. Soc., 1918, p. 23.

Description.—Test compressed, broad, gradually tapering to the broadly rounded initial end; triserial portion consisting of but few chambers; biserial portion compressed, making up most of the test; chambers rounded; wall of fine arenaceous material; the surface smoothly finished; aperture an elongate slit slightly in from the inner edge of the chamber, surrounded by a slightly thickened and raised lip; color gray.

Length about 1 mm.

Distribution.—The records for this species seem to be very widely scattered, few specimens occurring at any one station. I have had but two *Albatross* stations from the western Atlantic, one off the coast of Georgia and the other one in the northern part of the Gulf of Mexico. Brady gives a number of *Challenger* stations, both in the North and South Atlantic, mostly in fairly deep water. It does not seem to be present off the British Isles nor living in the Mediterranean. Neither Goës nor Flint record it from the western Atlantic. The only station of Brady's in our area is station 24, off the lesser Antilles.

Gaudryina chilostoma—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
16321	U.S.N.M.	1	D2398	28 45 00 N.; 86 26 00 W..	227	48.6	gy. m.	Rare.
16322	U.S.N.M.	1	D2416	31 26 00 N.; 79 07 00 W..	276	53.8	co. brk. sh.	Rare.

GAUDRYINA PSEUDOFILIFORMIS (Cushman.)

Plate 13, fig. 5.

Gaudryina filiformis H. B. Brady (not *G. filiformis* Berthelin), Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 380, pl. 46, figs. 12*a*–*c*.—Balkwill and Wright, Trans. Roy. Irish Acad., vol. 28, 1885, p. 333.—H. B. Brady, Journ. Roy. Micr. Soc., 1887, p. 896.—H. B. Brady, Parker, and Jones, Trans. Zool. Soc. London, vol. 12, 1888, p. 219, pl. 42, fig. 6.—Wright, Ann. Mag. Nat. Hist., ser. 6, vol. 4, 1889, p. 448; Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 472.—Flint, Rep. U. S. Nat. Mus., 1897 (1899), p. 287, pl. 33, fig. 2.—Earland, Journ. Quekett Micr. Club, ser. 2, vol. 9, 1905, p. 205.—Heron-Allen and Earland, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 57, pl. 4, figs. 7–9; Journ. Roy. Micr. Soc., 1916, p. 42; Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 232.

Gaudryina pseudofiliformis Cushman, Bull. 71, U. S. Nat. Mus., pt. 2, 1911, p. 70, figs. 11*a*, *b* (in text).—Pearcey, Trans. Roy. Soc. Edinburgh, vol. 49, 1914. p. 1013.—Cushman, Bull. 100, U. S. Nat. Mus., vol. 4, 1921, p. 151, pl. 29, fig. 8.

Description.—Test much elongate, composed of numerous chambers; early portion triserial with indistinct sutures; later portion, including nearly the entire test, biserial with the sutures deep and well marked; cross section elliptical, showing some compression; walls arenaceous, but usually smooth; aperture small, in adults back a little way from the inner margin of the chamber, slightly elongate, the edges thickened and raised to form a rim about it, appearing nearly toothlike in end view; color gray.

Length 1 mm.

Distribution.—I separated this recent species in 1911 from the Cretaceous species of Berthelin, which name was taken by Brady in the *Challenger* Report and has since been followed by many authors. Heron-Allen and Earland have criticized me for this (1916, p. 232) but Pearcey, from his examination of the *Challenger* specimens and others considers this change which I have made as "quite correct." From the material I have examined from the western Atlantic this species is hardly represented, but seems to be widely distributed, even in comparatively shallow water off the British Isles. Flint's specimens were from *Albatross* station D2352, 463 fathoms (847 meters), off the western coast of Cuba. The only specimens I have had are from *Albatross* station D2355, in 399 fathoms (729 meters), a station nearby that from which Flint records it. Brady had this species from the *Challenger* material from three stations in the North Atlantic and two in the South Atlantic, mostly being in deep water.

Gaudryina pseudofiliformis—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
16324.	U.S.N.M.	1	D2352...	22 35 00 N.; 84 23 00 W..	463	45.0	wh. co......	Rare.
16325	U.S.N.M.	2	D2355...	20 56 48 N.; 86 27 00.....	399	....	yl. oz.......	Rare.

Genus TRITAXILINA Cushman, 1911.

Clavulina (part) H. B. Brady, Quart. Journ. Micr. Sci., vol. 21, 1881, p. 54.

Tritaxia (part) H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 390.

Tritaxilina Cushman (type, *T. caperata* (H. B. Brady), Bull. 71, U. S. Nat. Mus., pt. 2, 1911, p. 71.

Description.—Test in its early development triserial, later becoming biserial and in the adult uniserial; chambers numerous, distinct, interior labyrinthic; wall arenaceous; aperture in the triserial portion elongate with a valvular lip, at the edge of the inner side of the chamber, in the adult central, terminal, usually with a series of peripheral teeth projecting in and partially closing the opening.

This genus includes the single species *T. caperata* H. B. Brady. This differs from *Tritaxia* in the form of the test, the peculiar aperture and the labyrinthic interior of the test.

TRITAXILINA CAPERATA (H. B. Brady), var. ATLANTICA, new variety.

Plate 15, figs. 1, 2.

Tritaxilina caperata H. B. Brady (part), Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 390, pl. 49, figs. 3*a*, *b* (not figs. 1, 2, 4, 5).

Description.—Variety differing from the typical in the general form of the test which in the triserial portion is less sharply triangular, the apex blunty rounded, the areas between the chambers much less excavated and distinct, uniserial portion not as well developed; color instead of grayish, a light yellowish-brown.

Distribution.—Type-specimen (U.S.N.M. No. 16323) from *Albatross* station D2150 in 382 fathoms (697 meters), Caribbean Sea. Brady records *T. caperata* from two Atlantic *Challenger* stations from off the Leeward Islands, station 23, 450 fathoms (823 meters), latitude 18° 25′ N., longitude 63° 29′ W., and station 24, 390 fathoms (713 meters), latitude 18° 38′ 30″ N., longitude 65° 05′ 30″ W. One of these is given in the *Challenger* Report on the foraminifera, the other in the volume on "Summary of Results." These stations are in the immediate vicinity of that from which the type specimens of the variety were obtained. An examination of the figures in the *Challenger* Report show both the typical *T. caperata* and this variety represented. Figure 3 shows a "young specimen" according to Brady. Captain Potts who has kindly examined the Brady collection for me reports that this specimen is from *Challenger* station 23 off the West Indies. I have had very typical specimens from off the Philippines at a number of stations, some of which are almost identical with the specimens figured by Brady. His other records are off the Philippines, in 95 fathoms (174 meters), and off Kandavu, Fiji, in 250 fathoms (457 meters). I also recorded what seems to be this species from *Albatross* station D4781, in 482 fathoms (880 meters), near the Aleutian Islands.

This variety therefore takes the place of the typical form of the species in the Atlantic, but what seems to me more probable, it will be found to be a distinct species from the Pacific one when more material is available.

Tritaxilina caperata, var. atlantica—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
16323	U.S.N.M.	7	D2150...	13° 34′ 45″ N.; 81° 21′ 10″ W..	382	°F. 45.8	wh. crs. s...	Common.

Genus CLAVULINA d'Orbigny, 1826.

Clavulina d'Orbigny (type, *C. parisiensis* d'Orbigny), Ann. Sci. Nat., vol. 7, 1826, p. 268.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 393.—Chapman, The Foraminifera, 1902, p. 171.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 2, 1911, p. 72.

Verneuilina (part) Parker and Jones, Quart. Journ. Geol. Sci., vol. 16, 1860, p. 303.—Vanden Broeck, Ann. Soc. Belgique Micr., vol. 2, 1876, p. 136.

Valvulina (part) Parker, Jones, and H. B. Brady, Ann. Mag. Nat. Hist., ser. 3, vol. 16, 1865, p. 35.

Description.—Test free, elongate, cylindrical or angled; early portion consisting of a number of chambers arranged triserially; later portion consisting of numerous chambers arranged uniserially; walls arenaceous, usually smooth, aperture in early chambers with a valvular tooth; in the later portion aperture central or nearly so, rounded, and with or without a tooth.

This genus includes those species in which there are three definite stages, the young being triserial, followed by a biserial, and finally a uniserial development. There is a considerable difference in the amount of acceleration of development shown in the various species. Usually the triserial stage is confined to the very early chambers, the biserial very much reduced or wanting, and the uniserial stage of development making up nearly the whole of the test. In some species, however, the acceleration of development is much less and the stages are held longer. This is seen in such a species as *C. gaudryinoides* Fornasini,[19] where the biserial stage is distinct. This is much more strikingly shown in *Clavulina primaeva* Cushman.[20] In this species the biserial stage is kept for nearly half the length of the test. In this respect the species is very unaccelerated and primitive.

The development shows very clearly the relationships. *Clavulina* has evidently been derived from such forms as *Verneuilina* with its triserial development, through *Gaudryina*, where a biserial arrangement of the chambers characterizes the adult. The paleontological evidence also bears out this relationship, *Verneuilina* and *Gaudryina* both being known as far back as the Lower Cretaceous while the history of *Clavulina* so far as known only goes back to the Eocene.

There are numerous species showing definite geographical distribution. Certain species are limited to warm shallow waters and others are found in deeper cold oceanic areas.

CLAVULINA NODOSARIA d'Orbigny.

Clavulina nodosaria D'ORBIGNY, in De la Sagra, Hist. Fis. Pol. Nat. Cuba, 1839, "Foraminifères," p. 110, pl. 2, figs. 19, 20.—CUSHMAN, Proc. U. S. Nat. Mus., vol. 59, 1921, p. 53, pl. 12, fig. 3; Publ. 311, Carnegie Inst. Wash., 1922, p. 30, pl. 3, figs. 1, 2.

Textularia gibba D'ORBIGNY, forma *Bigenerina* Goës, Köngl. Svensk. Vet. Akad. Handl., vol. 19, No. 4, 1882, p. 79, pl. 5, figs. 162–164 [?].

Clavulina laevigata Goës, Köngl. Svensk. Vet. Akad. Handl., vol. 25, No. 9, 1893, p. 40, pl. 8, figs. 356–367.

Clavulina communis Goës (not d'Orbigny) (part), Bull. Mus. Comp. Zoöl., vol. 29, 1896, p. 36, pl. 4, figs. 9–15 [?].

Description.—Test small, elongate, subcylindrical, early portion triserial, more or less triangular, the angles rounded, succeeding portion uniserial, hardly if at all tapering, circular in transverse section; chambers fairly numerous, those of the early portion less distinct than those of the later portion, those of the uniserial portion somewhat inflated; sutures distinct, slightly depressed, wall finely arenaceous, smoothly finished on the exterior; aperture one or more usually circular pores on the terminal face of the last-formed chamber; color light yellowish-gray.

Length usually less than 1 mm.

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[19] Mem. Acad. Sci. Bologna, ser. 6, vol. 10, 1903, p. 313, pl. O, fig. 21.

[20] Proc. U. S. Nat. Mus., vol. 44, 1913, p. 635, pl. 80, figs. 4, 5.

Distribution.—D'Orbigny described this species from shore sands of Cuba and the name has been allowed to lapse since that until I used it for specimens from the north coast of Jamaica. It is a small species which in this region at least seems to be distinct. It may be possible that this is the same as the species given various names by Goës in his series of papers upon the Caribbean foraminifera to which I have referred above, although Goës probably had more than one species present, from the measurements given. This small species is probably rather widely distributed in shallow water in the West Indies.

CLAVULINA NODOSARIA d'Orbigny, var. NOVANGLIAE, new variety.

Plate 15, figs. 3–5.

Description.—Test elongate, slender, slightly tapering, the early triserial portion much reduced, three-sided, the angles rounded, later portion circular in transverse section, increasing in size as the chambers are added; chamber very few in the triserial portion, five to eight in the uniserial portion, more or less indistinct except the last-formed ones, slightly inflated; sutures indistinct except near the apertural end where they are depressed, wall arenaceous, slightly roughened; aperture single, circular, terminal, often with a slight neck; color light gray.

Length up to 2 mm.

Distribution.—Type-specimen (U.S.N.M. No. 16317) from *Albatross* station D2247, in 78 fathoms (143 meters), south of Nantucket. It has occurred at several other stations in this same general region off the New England coast. I have placed it as a variety of this species, although it may be distinct, which can be determined by further collection. It reminds one somewhat of the form figured by Brady, *Challenger* Report (pl. 48, figs. 17, 18), but the triserial portion is more reduced and there is developed a slight tubular neck. From the material I have seen it seems to be limited to the New England coasts and the eastern Atlantic coast south to the Carolinas.

Clavulina nodosaria, var. novangliae—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
16315	U.S.N.M	1	D2244...	40 05 15 N.; 70 23 00 W..	67	52.9	gn. m.......	Rare.
16316	U.S.N.M	5	D2245...	40 01 15 N.; 70 20 30 W..	122	48.8	gn. m.......	Few.
16317	U.S.N.M	10	D2247...	40 03 00 N.; 69 57 00 W..	67	52.4	gn.m.,bk.sp.	Common.
16318	U.S.N.M	3	D2539...	39 59 45 N.; 70 53 00 W..	133	47.7	gn. s........	Few.
16319	U.S.N.M	6	*Fish Hawk* 1108.	40 02 00 N.; 70 37 30 W..	101	48.0	gy.m.fne.s.	Common.
16320	U.S.N.M	1						

CLAVULINA HUMILIS H. B. Brady, var. MEXICANA, new variety.

Plate 16, figs. 1-3.

Clavulina parisiensis D'ORBIGNY, var. *humilis* FLINT (not H. B. Brady), Rep. U. S. Nat. Mus., 1897 (1899), p. 289, pl. 36, fig. 1.

Description.—Test elongate, early portion sharply triangular, with a subacute apical end, later portion subcylindrical, slightly tapering; chambers of the early portion becoming somewhat more separate and distinct as added, those of the last-formed portion flask-shaped with a definite neck; sutures indistinct in the triserial portion, those of the later portion becoming somewhat more distinct and depressed, wall coarsely arenaceous, the surface roughened, fairly thick; aperture terminal, central, at the end of the tubular neck; color light gray.

Length up to 0.6 mm.

Distribution.—Type-specimen (U.S.N.M. No. 16653) from *Albatross* station D2377, 210 fathoms (384 meters), in the Gulf of Mexico. It is also found at numerous other stations, mostly in the Gulf of Mexico, but one off the coast of South Carolina, and another north of Panama. Flint had this variety from the northern part of the Gulf of Mexico, and from a single station off the coast of Brazil. D'Orbigny described *C. parisiensis* from the Eocene of the Paris Basin. His Modéle No. 66 shows a specimen with the early portion strongly triangular, the faces flat, and larger than the immediately succeeding portion, which is subcylindrical and slightly tapering, the chambers well marked, gradually enlarging as they are added. Such specimens as I have at hand from the Paris Basin and the Eocene of Grignon, and elsewhere, show a very similar form to that of d'Orbigny's Modéles. They are comparatively small and have a smooth, even surface. Such specimens are recorded as common in the Eocene of the London Clay. The figures of recent material assigned to *C. parisiensis* do not meet this requirement and seem to be a different species. For some reason the rough surface seems to have been taken as a characteristic which evidently it does not have in the fossil *C. parisiensis*. Brady describes the variety *humilis* from off the Philippines from specimens which are small, less than 1 mm. in length, and have the last-formed chambers more or less globular and distinct. Flint used this name for specimens which he figures from the Gulf of Mexico under this name in the reference given above. They are very much larger than Brady's Philippine specimens and they would seem to be distinct from those. *C. parisiensis* d'Orbigny can not be used for the recent material of this sort; the first available name is that of Brady, and it is here used for the variety he described from the Philippines. The material from the Gulf of Mexico and adjacent regions is clearly related to the Philippine form and seems to be distinct at least varietally. Much of the rough material which has been assigned to *C. parisiensis*, at least as far as the Gulf of Mexico region is concerned, can be included under this variety. Specimens assigned to *C. parisiensis* from other regions should be examined to see whether or not they are comparable to this. The fact that Brady figures at least two other distinct forms as *C. parisiensis* has made records depending on the *Challenger* figures alone of questionable position.

Clavulina humulis, var. mexicana—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
16651	U.S.N.M.	3	D2150...	13 34 45 N.; 81 21 10 W..	382	45.8	wh. crs. s....	Few.
16652	U.S.N.M.	3	D2314...	32 43 00 N.; 77 51 00 W..	159	47.4	cr. s. bk. sp..	Few.
16653	U.S.N.M.	10	D2377...	29 07 30 N.; 88 08 00 W..	210	67.0	gy. m.......	Common.
16654	U.S.N.M.	2	D2378...	29 14 30 N.; 88 09 30 W..	68	....	gy. m.......	Rare.
16655	U.S.N.M.	1	D2381...	28 05 00 N.; 87 56 15 W..	1,330	....	lt. br. m....	Rare.
16656	U.S.N.M.	1	D2383...	28 32 00 N.; 88 06 00 W..	1,181	39.6	br. gn. m....	Rare.
16657	U.S.N.M.	10	D2399...	28 44 00 N.; 86 18 00 W..	196	51.6	gy. m.......	Common.
16658	U.S.N.M.	7	D2400...	28 41 00 N.; 86 07 00 W..	169	....	gy. m.......	Common.

CLAVULINA COMMUNIS d'Orbigny.

Plate 16, figs. 4, 5.

Clavulina communis D'ORBIGNY, Ann. Sci. Nat., vol. 7, 1826, p. 268, No. 4; Foram. Foss. Bass. Tert. Vienne, 1846, p. 196, pl. 12, figs. 1, 2.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 394, pl. 48, figs. 1–8 (not 9–13.).—FORNASINI, Mem. Accad. Sci. Instit. Bologna, ser. 5, vol. 10, 1903, p. 146, (312), pl. 0, fig. 20.—CUSHMAN (part), Bull. 71, U. S. Nat. Mus., pt. 2, 1911, p. 73, fig. 117 (in text); Bull. 100, U. S. Nat. Mus., vol. 4, 1921, pl. 31, fig. 1.

Description.—Test elongate, subcylindrical, broadest near the initial end, early portion triserial, later and in the adult the larger portion uniserial, both portions circular in transverse section; chambers numerous, distinct except in the triserial portion; sutures generally distinct, little depressed; wall arenaceous, smoothly finished; aperture in the early portion at the side, in the later portion small, terminal, circular, often with a short protuberant neck; color light gray.

Length up to 4 mm.

Distribution.—The type-specimens which d'Orbigny had were from the Adriatic. Fornasini has figured a specimen from this region which shows what is probably typical *C. communis*. It is a cylindrical form with circular transverse section throughout, the chambers distinct but nearly flush with one another. Brady has figured a very similar series of specimens in the *Challenger* Report and I have had similar ones from the North Pacific. This is evidently a widely spread species and very uniform in its characters. Other forms have been assigned to this species, but it seems best to give it definite limits.

In its typical form the species has occurred in the western Atlantic at numerous stations from the latitude of Cape Cod southward along the Atlantic coast as well as from the Gulf of Mexico and Caribbean Sea. The following variety may be distinguished at least in some of the collections.

Clavulina communis—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
16290	U.S.N.M.	10	D2003...	37 16 30 N.; 74 20 36 W..	641	....	....	Common.
16291	U.S.N.M.	2	D2002...	37 20 42 N.; 74 17 36 W..	641	....	gn. m.......	Rare.
16292	U.S.N.M.	4	D2046...	40 02 49 N.; 68 49 00 W..	467	40.0	bu. m.......	Few.
16293	U.S.N.M.	8	D2144...	9 49 00 N.; 79 31 30 W..	896	....	gn. m.......	Common.
16294	U.S.N.M.	5	D2150...	13 34 45 N.; 81 21 10 W..	382	45.8	wh. crs. s....	Few.
16295	U.S.N.M.	2	D2187...	39 49 30 N.; 71 10 00 W..	420	39.7	gn. m. s......	Rare.
16296	U.S.N.M.	1	D2204...	39 30 30 N.; 71 44 30 W..	728	39.1	br. m.......	Rare.
16297	U.S.N.M.	1	D2262...	39 54 45 N.; 69 29 45 W..	250	41.6	gn. m. s......	Rare.
16298	U.S.N.M.	2	D2313...	32 53 00 N.; 77 53 00 W..	99	57.2	cr. s. bk. sp..	Rare.
16299	U.S.N.M.	5	D2355...	20 56 48 N.; 86 27 00 W..	399	....	yl. oz.......	Few.
16300	U.S.N.M.	10	D2377...	29 07 30 N.; 88 08 00 W..	210	67.0	gy. m.......	Common.
16301	U.S.N.M.	2	D2381...	28 05 00 N.; 87 56 15 W..	1,330	....	lt. br. m.....	Few.
16302	U.S.N.M.	1	D2394...	28 38 30 N.; 87 02 00 W..	420	41.8	gn. m.......	Rare.
16303	U.S.N.M.	1	D2398...	28 45 00 N.; 86 26 00 W..	227	48.6	gy. m.......	Rare.
16304	U.S.N.M.	1	D2415...	30 44 00 N.; 79 26 00 W..	440	45.6	co. crs. s.....	Rare.
16305	U.S.N.M.	10	D2541...	39 57 45 N.; 70 50 30 W..	134	47.7	gn. s. brk. sh.	Common.
16306	U.S.N.M.	10	D2542...	40 00 15 N.; 70 42 20 W..	129	47.2	s. brk. sh....	Common
16307	U.S.N.M.	10	D2544...	40 01 45 N.; 70 24 00 W..	131	47.7	gn. s. bk. sp..	Common.
16308	U.S.N.M.	1	D2550...	39 44 30 N.; 70 30 45 W..	1,081	38.5	br. m.......	Rare.
16309	U.S.N.M.	1	D2586...	39 02 40 N.; 72 40 00 W..	328	40.2	dk. gy. m....	Rare.

CLAVULINA COMMUNIS d'Orbigny, var. NODULOSA, new variety.

Plate 18, figs. 1–3.

Clavulina communis H. B. Brady (part), Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, pl. 48, figs. 9–12.—Flint, Rep. U. S. Nat. Mus., 1897 (1899), p. 288, pl. 34, fig. 3.—Sidebottom (part?), Journ. Roy. Micr. Soc., 1918, p. 25.

Description.—Variety differing from the typical form of the species in the longer form and especially in the shape of the chambers which in the variety are more or less pyriform, being broadest near the base of the chamber, giving a nodulose appearance to the uniserial portion; aperture usually without the definite protuberant neck of the typical form of the species.

Length up to 7 mm..

Distribution.—This variety is figured by Brady and Flint in the references given above. Sidebottom in his paper on the foraminifera from the east coast of Australia mentions one of two forms as "comparatively smooth, and the later chambers are fitted on to each other in such a manner as to cause the lower edge of the chambers to project slightly." This is evidently similar to the present variety and it may be widely spread.

The best specimens of this variety I have had from four stations off the eastern coast of the United States. The types are from *Albatross* station D2547 in 390 fathoms (713 meters).

Clavulina communis, var. nodulosa—material examined.

Cat. No.	Call. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°*F.*		
16810	U.S.N.M.	10	D2212...	39 59 30 N.; 70 30 45 W..	428	40.0	gn. m.......	Common.
16811	U.S.N.M.	1	D2542...	40 00 15 N.; 70 42 20 W..	129	47.2	s. brk. sh....	Rare.
16812	U.S.N.M.	10	D2547...	39 54 30 N.; 70 20 00 W..	390	39.6	gn. m.......	Common.
16813	U.S.N.M.	2	D2677...	32 39 00 N.; 76 50 30 W..	478	39.3	gn. m.......	Rare.

CLAVULINA FLINTIANA, new species.

Plate 15, figs. 7–9.

Valvulina triangularis d'Orbigny, var. *eocaena* Goës, Köngl. Svensk. Vet. Akad. Handl., vol. 19, No. 4, 1882, p. 88, pl. 11, figs. 401–403.

Clavulina eocaena Goës (not Gümbel), Köngl. Svensk. Vet. Akad. Handl., vol. 25, No. 9, 1894, p. 41, pl. 8, figs. 368–377; Bull. Mus. Comp. Zoöl., vol. 29, 1896, p. 36, pl. 4, figs. 16–25.—Flint, Rep. U. S. Nat. Mus., 1897 (1899), p. 289, pl. 35, fig. 1.

Description.—Test cylindrical, the triserial portion short, uniserial portion also short, composed of three or four, occasionally five chambers, transverse section rounded; chambers distinct, rounded, internally partially divided by a network of incomplete divisions, sutures in the uniserial portion indistinct; wall coarsely arenaceous but on the exterior rather smooth and finished; aperture a simple rounded opening in the center of the end wall of the chamber, in some cases with a slight valvular tooth; color reddish-brown.

Length up to 1.5 mm.

Distribution.—Type-specimen (U.S.N.M. No. 16869) from *Albatross* station D2425 in 119 fathoms (205 meters), off Cape Hatteras. Specimens are common at some stations off the coast of Florida and in the Gulf of Mexico. Goës records this species from the Caribbean in 68 to 830 fathoms (125 to 1,510 meters). I failed to find specimens in as deep water as this. Flint's records it from D2377 in 210 fathoms (384 meters), Gulf of Mexico, from which station I also have abundant specimens. It seems to be a common species at moderate depths and to show very little variation. I have named this species in honor of the late Admiral James M. Flint.

Clavulina flintiana—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
16748	U.S.N.M.	10	D2377...	29 07 30 N.; 88 08 00 W..	210	67.0	gy. m.......	Common.
16749	U.S.N.M.	1	D2378...	29 14 30 N.; 88 09 30 W..	68	....	gy. m.......	Rare.
16750	U.S.N.M.	1	D2381...	28 05 00 N.; 87 56 15 W..	1,330	....	lt. br. m.....	Rare.
16869	U.S.N.M.	1	D2395...	28 38 30 N.; 87 02 00 W..	420	41.8	gn. m.......	Rare.
16751	U.S.N.M.	10	D2425...	36 20 24 N.; 76 46 30 W..	119	51.5	dk. gy. m. fne. s.	Common.
16752 16901	U.S.N.M.	10	....	Ragged Key, Fla.........	75	....	....	Common.
16753 16903	U.S.N.M.	10	....	Key West, Fla............	78	....	....	Common.
				° ′ ″ ° ′ ″				
16754	U.S.N.M.	10	*Fish Hawk*, 949.	40 03 00 N.; 70 31 00 W..	100	52.0	yl. m.......	Common.
16902	U.S.N.M.	1	....	Govt. Cut, Fla...........	100	....	....	Rare.

CLAVULINA OCCIDENTALIS, new species.

Plate 17, figs. 1, 2.

Description.—Test elongate, slender, subcylindrical, circular in transverse section, triserial portion broader than the subsequent portion of the test; chambers numerous, fairly distinct; sutures indistinct, slightly depressed; wall finely arenaceous, somewhat roughened; aperture terminal, with a slight neck; color light gray.

Length up to 3 mm.

Distribution.—Type-specimen (U.S.N.M. No. 16739) from *Albatross* station D2383 in the Gulf of Mexico, in 1,181 fathoms (2,160 meters). It has occurred at several other stations in the Gulf of Mexico and Caribbean as well as at a number of stations on the eastern coast of the United States south of 49° N. latitude. This has, I am sure, been confused with *Reophax bacillaris* H. B. Brady. I took it to be a megalospheric form of that species and mentioned[21] that it had the appearance of a *Clavulina*. It is found alone in the Gulf of Mexico and Caribbean, showing apparently that the two are distinct.

This species is much smaller than *C. communis*, has a rougher exterior and much smaller triserial portion. The two when seen together are very distinct.

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[21] Bull. 104, U. S. Nat. Mus., pt. 2, 1920, p. 20.

Clavulina occidentalis—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
16730	U.S.N.M.	2	D2037...	38 53 00 N.; 69 23 30 W..	1,731	38.0	glob. oz.....	Rare.
16731	U.S.N.M.	2	D2038...	38 30 30 N.; 69 08 25 W..	2,033	....	glob. oz.....	Rare.
16732	U.S.N.M.	7	D2039...	38 19 26 N.; 68 20 20 W..	2,369	....	glob. oz.....	Common.
16744	U.S.N.M.	1	D2041...	39 22 50 N.; 68 25 00 W..	1,608	38.0	glob. oz.....	Rare.
16733	U.S.N.M.	5	D2042...	39 33 00 N.; 68 26 45 W..	1,555	38.5	glob. oz.....	Few.
16734	U.S.N.M.	3	D2106...	37 41 20 N.; 73 03 20 W..	1,497	42.5	glob. oz.....	Few.
16735	U.S.N.M.	4	D2138...	17 44 05 N.; 75 39 00 W..	23	....	co. brk. sh...	Few.
16736	U.S.N.M.	1	D2144...	9 49 00 N.; 79 31 30 W..	896	....	gn. m.......	Rare.
16737	U.S.N.M.	8	D2160...	23 10 31 N.; 82 20 37 W..	167	....	co...........	Common.
16738	U.S.N.M.	1	D2226...	37 00 00 N.; 71 54 00 W..	2,045	36.8	glob. oz.....	Rare.
16739	U.S.N.M.	4	D2383...	28 32 00 N.; 88 06 00 W..	1,181	39.6	br. gn. m....	Few.
16740	U.S.N.M.	1	D2392...	28 47 30 N.; 87 27 00 W..	724	40.7	br. gy. m....	Rare.
16741	U.S.N.M.	4	D2393...	28 43 00 N.; 87 14 30 W..	525	41.1	lt. gy. m.....	Few.
16742	U.S.N.M.	2	D2563...	39 18 30 N.; 71 23 30 W..	1,422	37.4	gy. oz.......	Rare.
16743	U.S.N.M.	1	D2564...	39 22 00 N.; 71 23 30 W..	1,390	37.3	gy. oz.......	Rare.
16314	U.S.N.M.	1	....	Off Key West, Fla.......	....	....	....	Rare.

CLAVULINA BRADYI Cushman.

Clavulina cylindrica H. B. Brady (not *Clavulina cylindrica* d'Orbigny, 1826, nor Hantken, 1875), Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 396, pl. 48, figs. 32–38.—Woodward, Journ. New York Micr. Soc., 1885, p. 150.—Chapman, Journ. Linn. Soc. Zool., vol. 28, 1902, p. 400.—Bagg, Proc. U. S. Nat. Mus., vol. 34, 1908, p. 134.—Chapman, Biol. Res. *Endeavour*, vol. 3, pt. 1, 1915, p. 17.

Clavulina bradyi Cushman, Bull. 71, U. S. Nat. Mus., pt. 2, 1911, p. 73, figs. 118, 119 (in text); Bull. 100, U. S. Nat. Mus., vol. 4, 1921, p. 155, pl. 31, fig. 4.

Description.—Test stout, cylindrical, the early triserial portion not well shown exteriorly, the later uniserial portion of few chambers, large, distinct, with well-defined, depressed sutures; wall arenaceous, composed of a mixture of coarse and fine material, but usually with a smooth exterior; aperture circular, often at the end of a short neck, usually with a single valvular tooth; color light gray.

Length up to 5 mm.

Distribution.—Brady records this species from four stations in the North Atlantic, off Gomera, Canaries, 620 fathoms (1,134 meters); off Sombrero Island, West Indies, 450 fathoms (823 meters); off Bermuda, 435 fathoms (796 meters); off the Azores, 450 fathoms (823 meters), and one station in the South Atlantic east of Buenos Aires, 1,900 fathoms (3,475 meters). I have failed to find this species in the *Albatross* material from the western Atlantic. Woodward records it from shallow water, Shelly Bay, Bermuda. I have seen no specimens referable to this in the Bermuda material I have had.

It is recorded at several stations in the Pacific.

CLAVULINA OBSCURA Chaster.

Plate 16, fig. 6.

Verneuilina polystropha (Reuss) "dimorphous form" J. Wright, Rep. Belfast Nat. Field Club, 1886, Appendix, p. 320, pl. 26, fig. 2.

Clavulina obscura Chaster, First Rep. Southport Soc. Nat. Sci., 1892, p. 58, pl. 1, fig. 4.—Earland, Journ. Quekett Micr. Club, ser. 2, vol. 9, 1905, p. 206.—Heron-Allen and Earland, Journ. Roy. Micr. Soc., 1908, p. 311; Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 59, pl. 4, fig. 6; Journ. Roy. Micr. Soc., 1916, p. 42; Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 233.

This small species described by Chaster from off Southport has been recorded by Heron-Allen and Earland from shore sands of Bognor, Sussex, from nine stations in the Clare Island region, from off South Cornwall, and from four stations off the west of Scotland. I have seen no specimens from the western Atlantic which are comparable to this species as figured by the English writers.

CLAVULINA TRICARINATA d'Orbigny.

Plate 17, figs. 3, 4.

Clavulina tricarinata d'Orbigny, in De la Sagra, Hist. Fis. Pol. Nat. Cuba, 1839, "Foraminifères," p. 111, pl. 2, figs. 16–18.—Cushman, Proc. U. S. Nat. Mus., vol. 59, 1921, p. 52, pl. 12, figs. 1, 2; Publ. 311, Carnegie Inst. Wash., 1922, p. 29, pl. 3, fig. 3.

Clavulina angularis Woodward (not d'Orbigny), Journ. New York Micr. Soc., 1885, p. 150.—Goës, Bull. Mus. Comp. Zoöl., vol. 29, 1896, p. 37.—Flint, Rep. U. S. Nat. Mus., 1897 (1899), p. 289, pl. 36, fig. 2.—Cushman, Papers Dept. Marine Biol. Carnegie Inst., vol. 9, 1918, pp. 271 *et seq.*

Valvulina triangularis d'Orbigny, forma *Clavulina angularis* Goës, Köngl. Svensk. Vet. Akad. Handl., vol. 19, No. 4, 1882, p. 86, pl. 11, figs. 387–389.

Description.—Test elongate, tapering, triangular or quadrangular, in transverse section, increasing in diameter to the apertural end; chambers numerous, those of the early triserial portion obscure, those of the uniserial portion distinct, each with three or more lateral angles in line with those above and below; sutures in the uniserial portion distinct, slightly depressed; wall arenaceous but smoothly finished; aperture circular, terminal, without a definite neck but with a small valvular tooth; color white or gray.

Length up to 3 mm.

Distribution.—This species was originally described by d'Orbigny from shore sands of Cuba. It was placed by Brady as a synonym of *C. angularis* d'Orbigny described from the Mediterranean. As I have already shown,[22] the two certainly seem to be distinct species. The West Indian species is strongly angled throughout, while that of the Mediterranean has its later chambers rounded.

The species is evidently common in shallow water in the West Indian region and at Bermuda. I have it from the latter place, from Jamaica, and from numerous stations off the coast of Florida and the Bahamas. In the deeper water it has occurred in the *Albatross* dredgings from D2388 in 35 fathoms (66 meters) in the northern part of the Gulf of Mexico, and from D2758 in 20 fathoms (37 meters) off the coast of Brazil.

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[22] Proc. U. S. Nat. Mus., vol. 59, 1921, p. 53.

Goës records it from 300 fathoms (549 meters) in the Caribbean and Flint from *Albatross* station D2358 in 222 fathoms (407 meters) in the Straits of Yucatan.

The species is close to *C. difformis* Brady and probably is distributed widely in the Indo-Pacific in similar habitats to those in which it is found in the Atlantic.

Clavulina tricarinata—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
16745	U.S.N.M.	1	D2388...	29 24 30 N.; 88 01 00 W..	35	....	yl. s. bk. sp..	Rare.
16746	U.S.N.M.	1	D2758...	6 59 00 S.; 34 47 00 W..	20	79.0	brk. sh......	Rare.
16747	U.S.N.M.	1	....	Off Bell, Fowey, Fla....	....	....	....	

Subfamily 4. BULIMININAE.

Included in this family are those forms which are typified by *Bulimina*. In typical species the arrangement of the chambers is an elongate spiral. The aperture is elongate, loop-shaped, usually in an oblique position, and in some species there is a tooth, flange, or other structure which partially closes the opening. The test is calcareous, often hyaline in the young, but may be considerably thickened and opaque in the adult; is always perforate.

Genus BULIMINA d'Orbigny, 1826.

Bulimina D'ORBIGNY (type, *Bulimina marginata* d'Orbigny), Ann. Sci. Nat., vol. 7, 1826, p. 269.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 397.—CHAPMAN, The Foraminifera, 1902, p. 172.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 2, 1911, p. 76.

Description.—Test usually fusiform or tapering, free, composed of numerous chambers arranged typically in a spiral, each chamber situated above the third preceding one, making a triserial arrangement, not always visible from the surface except in the last convolution; wall calcareous, perforate, usually thin and transparent, but thickening somewhat with age, smooth or ornamented with raised costae, spines, etc.; aperture typically a comma-shaped slit broadest above and tapering obliquely to a point below, usually with a raised margin and often partly closed by a tooth-like rim at one side.

In 1911 in the above reference I limited the genus *Bulimina* to that group of species which show a triserial arrangement of chambers and a more or less regular form, erecting two new genera, *Buliminella* and *Buliminoides*.

The genus *Bulimina* as thus distinguished includes numerous smooth species and others ornamented by spines or raised costae. The genus is widely distributed, some of the species having a very wide range, while others appear to be more restricted. The recent species are all forms with calcareous secreted tests, and in the fossil forms, especially in the lower Cretaceous, there are numerous species which have an arenaceous test.

BULIMINA MARGINATA d'Orbigny.

Plate 21, figs. 4, 5.

Bulimina marginata d'Orbigny, Ann. Sci. Nat., vol. 7, 1826, p. 269, No. 4, pl. 12, figs. 10–12.—Parker and Jones, Ann. Mag. Nat. Hist., ser. 2, vol. 19, 1857, p. 296, pl. 11, figs. 35–40.—Balkwill and Wright, Proc. Roy. Irish Acad., ser. 2, vol. 3, 1882, p. 447.—H. B. Brady, Rep. Voy. *Challenger*. Zoology, vol. 9, 1884, p. 405, pl. 51, figs. 3–5.—Balkwill and Wright, Trans, Roy. Irish Acad., vol. 28, 1885, p. 333.—H. B. Brady, Journ. Micr. Soc., 1887, p. 897.—H. B. Brady, Parker, and Jones, Trans. Zool. Soc., vol. 12, 1888, p. 220, pl. 43, figs. 7, 10.—Wright, Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 474.—Robertson, Trans. Nat. Hist. Soc. Glasgow, vol. 3, pt. 3, 1892, p. 240.—Egger, Abh. kön. bay. Akad. Wiss. München, Cl. II, vol. 18, 1893, p. 287, pl. 8, figs. 69, 70.—Goës, Köngl. Svensk. Vet. Akad. Handl., vol. 25, No. 9, 1894, p. 46, pl. 9, figs. 439–444.—Millett, Journ. Roy. Micr. Soc., 1899, p. 277.—Earland, Journ. Quekett Micr. Club, ser. 2, vol. 9, 1905, p. 207.—Chapman, Trans. New Zealand Inst., vol. 38, 1905, p. 89.—Heron-Allen and Earland, Journ. Roy. Micr. Soc., 1908, p. 312.—Chapman, Rep. Foram. Subantarctic Ids. New Zealand, 1909, p. 330.—Sidebottom, Mem. Proc. Manchester Lit. Philos. Soc., vol. 54, pt. 3, 1910, p. 12.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 2, 1911, p. 83, figs. 136*a*, *b* (in text).—Heron-Allen and Earland, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 63; Journ. Roy. Micr. Soc., 1916, p. 42; Trans. Linn. Soc. London, vol. 11, ser. 2, 1916, p. 236.—Mestayer, Trans. New Zealand Inst., vol. 48, 1916, p. 129.—Sidebottom, Journ. Roy. Micr. Soc., 1918, p. 123.—Cushman, Proc. U. S. Nat. Mus., vol. 56, 1919, p. 605; Bull. 100, U. S. Nat. Mus., vol. 4, 1921, p. 159.

Bulimina pupoides d'Orbigny, var. *marginata* Williamson, Rec. Foram. Great Britain, 1858, p. 62, pl. 5, figs. 126, 127.

Bulimina presli Reuss, var. *marginata* Parker and Jones, Philos. Trans., vol. 155, 1865, p. 372, pl. 15, fig. 10; pl. 17, fig. 70.

Description.—Test ovate, somewhat tapering; chambers numerous, inflated, all visible from the exterior, ventral margin of the chambers extending out from the preceding by a definite acute angle, forming a definite rim to the chamber which has a series of short spines or crenulations, the remainder of the chamber smooth and curved; sutures distinct, depressed, wall thin and transparent, usually in older specimens somewhat thickened, white, and nearly opaque; aperture a comma-shaped slit in a slight depression of the inner face of the chamber, often with a slightly raised border.

Length usually from 0.50–0.75 mm., occasionally reaching 0.1 mm. in length.

Distribution.—In the *Albatross* material examined the species is often abundant, south from the latitude of Cape Cod, and as far as the coast of South Carolina. Similar specimens occur in the northern part of the Gulf of Mexico and off Key West, Florida. In the *Challenger* collection Brady records it from off the eastern coast of the United States and off the West Indies. From the eastern part of the Atlantic it is known from numerous stations off the British Isles, from the coasts of Norway, Sweden, and Spitzbergen in 50–270 meters (27–147 fathoms) (Goës). Heron-Allen and Earland record it from 23 stations in the Clare Island region, and from 24 stations off western Scotland. Specimens are recorded from 3 stations off the Abrohlos Bank in 40–260 fathoms (73–476 meters) (H. B. Brady, Parker, and Jones).

The species is recorded from various parts of the world, but the material that I have seen elsewhere than in the Atlantic is not typical in all respects. The North Atlantic material has a definite angular character, the chambers with the edges of the adjacent chambers forming a peculiar oblique angled appearance. This is not shown in Brady's figures of the *Challenger* Report, but I have tried to illustrate it in the accompanying figures. There is also a considerable difference in the margins of the chambers, the type figures of Brady showing very long spines, a condition which is also shown in some of Goës's figures, but in the material from the western Atlantic and in that I have seen from off the British Isles the specimens seem to have very short spines.

The specimens I have recorded from off New Zealand are much shorter and more rapidly developed than are the specimens from the western Atlantic. That may be that the material from the South Pacific is of a different species. This might seem more probable in that the *Albatross* records are mostly from cold water, very few of them being in the Gulf of Mexico. A great majority are in the cold water off the New England coast.

Bulimina marginata—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance
				° ′ ″ ° ′ ″		°*F.*		
16133	U S.N.M.	10	D2003...	37 16 30 N.; 74 20 36 W..	641	....	....	Common.
17069	U.S.N.M.	5	D2022...	37 32 00 N.; 74 13 20 W..	487	40.0	bu. m.......	Few.
16134	U.S.N.M.	3	D2048...	40 02 00 N.; 68 50 30 W..	547	29.0	crs. s. m. g...	Few.
16135	U.S.N.M.	2	D2084...	40 16 50 N.; 67 05 15 W..	1,290	40.0	bu. m. s......	Few.
16136	U.S.N.M.	1	D2172...	38 01 15 N.; 73 44 00 W..	568	39.0	gn. m........	Rare.
16137	U.S.N.M	1	D2192...	39 46 30 N.; 70 14 45 W..	1,060	38.6	gy. oz........	Rare.
16138	U.S.N.M.	1	D2202...	39 38 00 N.; 71 39 45 W..	515	39.1	gn. m........	Rare.
16139	U.S.N.M	10	D2242...	40 15 30 N.; 70 27 00 W..	58	51.4	gn. m........	Common.
16140 17071	U.S.N.M.	10	D2247...	40 03 00 N.; 69 57 00 W..	67	52.4	gn. m. bk. s.	Common.
16141	U.S.N.M.	6	D2249...	40 11 00 N.; 69 52 00 W..	53	51.4	gn. m. fne. s.	Common.
16142	U.S.N.M.	10	D2262...	39 54 45 N.; 69 29 45 W..	250	41.6	gn. m. s......	Common.
16143	U.S.N.M.	1	D2263...	37 08 00 N.; 74 33 00 W..	430	....	gn. m........	Rare.
16144	U.S.N.M.	8	D2265...	37 07 40 N.; 74 35 40 W..	70	57.9	gn. m. g......	Common.
16145	U.S.N.M.	2	D2309...	35 43 30 N.; 74 52 00 W..	56	....	gy. s. brk. sh	Few.
16146	U.S.N.M.	2	D2311...	32 55 00 N.; 77 54 00 W..	79	59.1	crs.s.bk.sp.	Few.
16147	U.S.N.M.	1	D2378...	29 14 30 N.; 88 09 30 W..	68	....	gy. m........	Rare.
16148	U.S.N.M.	1	D2399...	28 44 00 N.; 86 18 00 W..	196	51.6	gy. m........	Rare.
16149	U.S.N.M.	5	D2539...	39 59 45 N.; 70 53 00 W..	133	47.7	gn. s.........	Few.
16150	U.S.N.M.	10	D2542...	40 00 15 N.; 70 42 20 W..	129	47.2	s. brk. sh....	Common.
16151	U.S.N.M	3	D2547...	39 54 30 N.; 70 20 00 W..	390	39.6	gn. m........	Few.
16152	U.S.N.M.	10	D2550...	39 44 30 N.; 70 30 45 W..	1,081	38.5	br. m.	Common.
16153	U.S.N.M.	10	D2555...	39 53 00 N.; 71 32 00 W..	136	47.7	gn. m. s......	Common.
16154	U.S.N.M.	2	D2614...	34 09 00 N.; 76 02 00 W..	168	....	gy. s. bk. sp.	Few.
16155	U.S.N.M.	1	D2677...	32 30 00 N.; 76 50 30 W..	478	39.3	gn. m........	Rare.
			Fish Hawk.					
16156	U.S.N.M.	10	1108.....	40 02 00 N.; 70 37 30 W..	101	48.0	gy. m. fne. s.	Common.
16157	U.S.N.M.	8	1110.....	40 02 00 N.; 70 35 00 W..	100	48.7	gn. n. fne. s..	Common.
16158	U S.N.M.	1	....	Key West, Fla...........	65	....	....	Rare.
16159	U.S.N.M.	2	....	Ragged Key, Fla.........	75	....	....	Rare.
16160	U.S.N.M.	1	....	Key West, Fla...........	78	....	....	Rare.
......	J.A.C.	8	....	S. S. *Flying Falcon*, S. W. of Ireland.	345	....	....	Common.
......	J.A.C.	4	....	Coast of Iceland..........	....	....	....	Few.

BULIMINA INFLATA Seguenza.

Plate 21, fig. 1.

Bulimina inflata SEGUENZA, Atti Accad. Gioenia Sci. Nat., ser. 2, vol. 18, 1862, p. 109, pl. 1, fig. 10.—SCHWAGER, *Novara*-Exped. geol. Theil, vol. 2, 1866, p. 246, pl. 7, fig. 91.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 406, pl. 51, figs. 10–13.—H. B. BRADY, PARKER, and JONES, Trans. Zool. Soc., vol. 12, 1888, p. 220, pl. 43, fig. 9.—WRIGHT, Ann. Mag. Nat. Hist., ser. 6, vol. 4, 1889, p. 448.—PEARCEY, Trans. Nat. Hist. Soc. Glasgow, vol. 2, 1890, p. 177.—WRIGHT, Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 474.—EGGER, Abh. kön. bay. Akad. Wiss. München, Cl. II, vol. 18, 1893, p. 288, pl. 8, fig. 85.—CHAPMAN, Proc. Zool. Soc. London, 1895, p. 22.—GOËS, Bull. Mus. Comp. Zoöl., vol. 29, 1896, p. 46.—FLINT, Rep. U. S. Nat. Mus., 1897 (1899), p. 291, pl. 37, fig. 5.—MILLETT, Journ. Roy. Micr. Soc., 1899, p. 279.—CUSHMAN, Amer. Geologist, vol. 33, 1904, p. 265.—CHAPMAN, Trans. New Zealand Inst., vol. 38, 1905, p. 89.—BAGG, Proc. U. S. Nat. Mus., vol. 34, 1908, p. 135.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 2, 1911, p. 84, figs. 137*a*, *b* (in text).—CHAPMAN, Zool. Res. *Endeavour*, pt. 3, 1912, p. 310; Biol. Res. *Endeavour*, vol. 3, pt. 1, 1915, p. 18.—SIDEBOTTOM, Journ. Roy. Micr. Soc., 1918, p. 123.—CUSHMAN, Bull. 100, U. S. Nat. Mus., vol. 4, 1921, p. 160, pl. 31, fig. 6.

Description.—Test short, ovate, composed of overlapping chambers, triserial, the sutures deep; edge of chamber extending out into a free winglike expansion with a crenulated border extending outward into short spines, from which raised costae extend back into the outer surface of the chambers; upper portions of the chambers smooth and unornamented; wall transparent and thin in the young, becoming thickened and white in the adult; aperture an obliquely placed slit, elongated, widest near the upper end, usually with a raised border, and often with a lip extending in on the concave side.

Length 0.4–1.0 mm.

Distribution.—This is a very widely spread species, especially in comparatively deep water, occurring usually in some numbers wherever *Globigerina*-ooze occurs. Along the Atlantic coast it has been found at numerous stations and according to the records it occurs also in fairly deep water off the coast of Europe. It is recorded by Brady, Parker, and Jones from the Abrohlos Bank off Brazil, and it is also recorded from various parts of the Pacific. It is replaced in the Gulf of Mexico and in the Caribbean by the following variety.

Bulimina inflata—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
16422	U.S.N.M.	1	D2003...	37 16 30 N.; 74 20 36 W..	641	....	....	Rare.
16423	U.S.N.M.	10	D2018...	37 12 22 N.; 74 20 04 W..	788	39.0	bu. m.......	Common.
16424	U.S.N.M.	10	D2029...	39 42 00 N.; 70 47 00 W..	1,168	38.5	gy. m........	Common.
16425	U.S.N.M.	1	D2034...	39 27 10 N.; 69 56 20 W..	1,346	38.0	glob. oz......	Rare.
16426	U.S.N.M.	1	D2036...	38 52 40 N.; 69 24 40 W..	1,735	38.0	glob. oz......	Rare.
16427	U.S.N.M.	3	D2050...	39 42 50 N.; 69 21 20 W..	1,050	44.5	glob. oz......	Few.
16101	U.S.N.M.	6	D2052...	39 40 05 N.; 69 21 25 W..	1,098	45.0	glob. oz......	Few.
16102	U.S.N.M.	2	D2063...	42 23 00 N.; 66 23 00 W..	141	46.0	s. crs. g......	Rare.
16103	U.S.N.M.	5	D2093...	39 42 50 N.; 71 01 20 W..	1,000	39.0	for. s.........	Few.
16104	U.S.N.M.	2	D2111...	35 09 50 N.; 74 57 40 W..	938	....	gn. m........	Rare.
16105	U.S.N.M.	1	D2172...	38 01 15 N.; 73 44 00 W..	568	39.0	gn. m........	Rare.
16106	U.S.N.M.	9	D2192...	39 46 30 N.; 70 14 45 W..	1,060	38.6	gy. oz........	Common.
16107	U.S.N.M.	1	D2196...	39 35 00 N.; 69 44 00 W..	1,230	38.0	gn. m........	Rare.
16108	U.S.N.M.	6	D2202...	39 38 00 N.; 71 39 45 W..	515	39.1	gn. m........	Few.
16109	U.S.N.M.	7	D2203...	39 34 15 N.; 71 41 15 W..	705	38.9	g. m. s........	Common.
16110	U.S.N.M.	7	D2204...	39 30 30 N.; 71 44 30 W..	728	39.1	br. m........	Common.
16111	U.S.N.M.	1	D2212...	39 59 30 N.; 70 30 45 W..	428	40.0	gn. m........	Rare.
16112	U.S.N.M.	5	D2217...	39 47 20 N.; 69 34 15 W..	924	38.1	gy. m........	Few.
16113	U.S.N.M.	2	D2230...	38 27 00 N.; 73 02 00 W..	1,168	36.8	gy. oz........	Few.
16114	U.S.N.M.	1	D2234...	39 09 00 N.; 72 03 15 W..	810	38.6	gn. m........	Rare.
16115	U.S.N.M.	7	D2231...	38 29 00 N.; 73 09 00 W..	965	36.8	gy. oz........	Common.
16116	U.S.N.M.	3	D2235...	39 12 00 N.; 72 03 30 W..	707	38.8	gn. m........	Few.
16117	U.S.N.M.	3	D2528...	41 47 00 N.; 65 37 30 W..	677	38.7	br. s..........	Few.
16118	U.S.N.M.	9	D2530...	40 53 30 N.; 66 24 00 W..	956	38.4	gy. oz........	Common.
16119	U.S.N.M.	8	D2534...	40 01 00 N.; 67 29 15 W..	1,234	37.8	gy. oz........	Common.
16120	U.S.N.M.	4	D2535...	40 03 30 N.; 67 27 15 W..	1,149	37.8	gy. oz........	Few.
16121	U.S.N.M.	2	D2542...	40 00 15 N.; 70 42 20 W..	129	47.2	s. brk. sh....	Rare.
16122	U.S.N.M.	1	D2547...	39 54 30 N.; 70 20 00 W..	390	39.6	gn. m........	Rare.
16123	U.S.N.M.	6	D2550...	39 44 30 N.; 70 30 45 W..	1,081	38.5	br. m........	Few.
16124	U.S.N.M.	2	D2564...	39 22 00 N.; 71 23 30 W..	1,390	37.3	gy. oz........	Few.
16125	U.S.N.M.	2	D2680...	39 50 00 N.; 70 26 00 W..	555	....	....	Few.
16126	U.S.N.M.	3	D2581...	39 43 00 N.; 71 34 00 W..	394	....	gn. m........	Few.
16127	U.S.N.M.	8	D2689...	39 42 00 N.; 71 15 30 W..	525	....	gn. m........	Common.
16128	U.S.N.M.	7	D2705...	42 47 00 N.; 61 04 00 W..	1,255	....	lt. br. oz......	Common.
16129	U.S.N.M.	3	D2706...	41 28 30 N.; 65 35 30 W..	1,188	....	gy. oz. for....	Few.
16130	U.S.N.M.	10	D2710...	40 06 00 N.; 68 01 00 W..	984	....	gn. m........	Common.
16131	U.S.N.M.	2	D2684...	39 35 00 N.; 70 54 00 W..	1,106	....	br. c. bk. sp..	Few.
16132	U.S.N.M.	8	D2748...	39 31 00 N.; 71 14 30 W..	1,163	37.8	gy. m. for....	Common.

BULIMINA INFLATA Seguenza, var. MEXICANA, new variety.

Plate 21, fig. 2.

Description.—Test differing from the typical in the larger number, higher and more definite ridges tending toward *B. buchiana.* The form, however, is that of *inflata.* The test is more translucent, and thinner than in the more northern form.

Distribution.—Type-specimen (U.S.N.M. No. 16402) from *Albatross* station D2377, in 210 fathoms (384 meters). It has also occurred at several other stations in this general region.

Bulimina inflata, var. mexicana—material consumed.

Cat. No	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″				
16396	U.S.N.M.	3	D2144...	9 49 00 N.; 79 31 30 W..	896	....	gn. m.......	Few.
16397	U.S.N.M.	1	D2150...	13 34 45 N.; 81 21 10 W..	382	45.8	wh. crs. s...	Rare.
16398	U.S.N.M.	10	D2313...	32 53 00 N.; 77 53 00 W..	99	57.2	crs. s. bk. sp.	Common.
16399	U.S.N.M.	1	D2318...	24 25 45 N.; 81 46 00 W..	45	75.0	co...........	Rare.
16400	U.S.N.M.	1	D2330...	23 10 40 N.; 82 20 15 W..	191	....	co...........	Rare.
16401	U.S.N.M.	1	D2352...	22 35 00 N.; 84 23 00 W..	463	45.0	wh. co.......	Rare.
16402	U.S.N.M.	10	D2377...	29 07 30 N.; 88 08 00 W..	210	67.0	gy. m.......	Common.
16403	U.S.N.M.	3	D2381...	28 05 00 N.; 87 56 15 W..	1,330	....	lt. br. m....	Rare.
16404	U.S.N.M.	3	D2393...	28 43 00 N.; 87 14 30 W..	525	41.1	lt. gy. m....	Rare.
16405	U.S.N.M.	1	D2394...	28 38 30 N.; 87 02 00 W..	420	41.8	gn. m.......	Rare.
16406	U.S.N.M.	2	D2396...	28 45 00 N.; 86 26 00 W..	227	48.6	gy. m.......	Rare.
16407	U.S.N.M.	3	D2399...	28 44 00 N.; 86 18 00 W..	196	51.6	gy. m.......	Rare.
16408	U.S.N.M.	1	D2629...	23 48 40 N.; 75 10 40 W..	1,169	38.4	co. s.........	Rare.
16409	U.S.N.M.	10	D2677...	32 39 00 N.; 76 50 30 W..	478	39.8	gn.m........	Common.
16410	U.S.N.M.	3	D2679...	32 40 00 N.; 76 40 30 W..	782	38.6	lt. gy. oz....	Rare.
16411	U.S.N.M.	2	D2721...	38 56 00 N.; 72 11 30 W..	813	....	gy. oz.......	Rare.
16412	U.S.N.M.	1	D2761...	15 30 00 S.; 38 32 54 W..	818	39.0	pter. oz.....	Rare.
16413	U.S.N.M.	1	H80.....	13 56 35 N.; 63 02 00 W..	684	....	gy. m. for...	Rare.

BULIMINA BUCHIANA d'Orbigny.

Plate 20, fig. 4.

Bulimina buchiana d'Orbigny, For. Foss. Vienne, 1846, p. 186, pl. 11, figs. 15–18.—Reuss, Sitz. kais. Akad. Wiss. Wien, vol. 55, 1867, p. 95, pl. 4, figs. 10*a*, *b*.—Terrigi, Atti Acc. Pont. Nuovi Lincei, vol. 33, 1880, p. 195, pl. 2, fig. 37.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 407, pl. 51, figs. 18, 19; Journ. Roy. Micr. Soc., 1887, p. 899.—Wright, Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 474.—Egger, Abh. kön. bay. Akad. Wiss. München, Cl. II, vol. 18, 1893, p. 286, pl. 8, figs. 68, 77.—Chapman, Proc. Zool. Soc. London, 1895, p. 22; Cal. Acad. Sci., vol. 1, ser. 3, 1904, p. 244, pl. 29, fig. 5; Journ. Quekett Micr. Club, 1907, p. 127, pl. 9, fig. 6.—Bagg, Bull. U. S. Nat. Mus., vol. 34, 1908, p. 135.—Chapman, Journ. Linn. Soc., vol. 30, 1910, p. 403.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 2, 1911, p. 85, figs. 138*a*, *b* (in text).—Pearcey, Trans. Roy. Soc. Edinburgh, vol. 49, 1914, p. 1014.—Chapman, Biol. Results *Endeavour*, vol. 3, pt. 1, 1915, p. 18.—Cushman, U. S. Geol. Survey, Bull. 676, 1918, p. 50; Bull. 100, U. S. Nat. Mus., vol. 4, 1921, p. 160.

Bulimina presli Reuss, var. *buchiana* Parker and Jones, Philos. Trans., vol. 155, 1865, p. 374, pl. 17, fig. 71.

Bolivina karreriana Bagg, Proc. U. S. Nat. Mus., vol. 34, 1908, p. 138 (not *B. karreriana* H. B. Brady).

Description.—Test ovate, broadest above the middle, composed of numerous inflated chambers, the remainder of the test consisting of longitudinal plate-like costae, confluent from the apex to the base of the last-formed chamber; chambers distinct, inflated, smooth except for the longitudinal costae; sutures distinct, somewhat depressed, wall in young specimens thin and translucent, in the adults thickened and opaque; aperture a loop-like opening of the inner margin of the chamber with a definite margined lip; color white.

Length 0.30–0.75 mm.

Distribution.—This has proved to be much rarer than most of the other species of the genus in the *Albatross* material from the western Atlantic. It has occurred at two stations off the continental shelf at about 40° N., at one station off the eastern coast of Florida, at two in the northern part of the Gulf of Mexico, and at three stations in the eastern part of the Caribbean. Brady's Atlantic records are two stations north of the Lesser Antilles, two stations off the Azores, one off the Canaries, and another off the coast of Brazil. Neither Goës or Flint record the species.

There are a very few stations in the eastern Atlantic southwest of Ireland, in 48 to 750 fathoms (87 to 1,370 meters). Pearcey records it in the South Atlantic in 742 fathoms (1,357 meters) and mentions it as "common in the North Atlantic, from latitude 60° to the Equator, 150 to 1,675 fathoms (274 to 3,063 meters)." There are numerous records for the species in the South Pacific. Brady's original specimens were from the Miocene of the Vienna Basin. I have found it from the Miocene of the Coastal Plain in Virginia, and Chapman records it from the Pliocene of California. It is known from the Tertiary in various places.

Bulimina buchiana—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
16414	U.S.N.M.	1	D2117...	15 24 20 N.; 63 31 30 W..	683	39.8	y. m. fne. s..	Rare.
16415	U.S.N.M.	1	D2189...	39 49 30 N.; 70 26 00 W..	600	39.7	gn. m. s.....	Rare.
16416	U.S.N.M.	1	D2395...	28 36 15 N.; 86 50 00 W..	347	44.1	gy. m.......	Rare.
16417	U.S.N.M.	2	D2396...	28 34 00 N.; 86 48 00 W..	335	....	gy. m.......	Rare.
16418	U.S.N.M.	3	D2573...	40 34 18 N.; 66 09 00 W..	1,742	37.3	gy. m. s.....	Few.
16419	U.S.N.M.	1	D2644...	25 40 00 N.; 80 00 00 W..	193	43.4	gy. s	Rare.
16420	U.S.N.M.	1	H59.....	17 42 10 N.; 65 39 40 W..	789	....	oz. for.......	Rare.
16121	U.S.N.M.	1	H79.....	14 20 30 N.; 63 10 00 W..	821	....	co.s. sh......	Rare.

BULIMINA ACULEATA d'Orbigny.

Plate 22, figs. 1, 2.

Polymorpha pineiformis SOLDANI, Testaceographia, vol. 1, pt. 2, 1791, p. 118, pl. 127, fig. 1; pl. 130, fig. vv.

Bulimina aculeata D'ORBIGNY, Ann. Sci. Nat., vol. 7, 1826, p. 269.—H. B. BRADY Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 406, pl. 51, figs. 7-9.—BALKWILL and WRIGHT, Trans. Roy. Irish Acad., vol. 28, 1885, p. 334.—H. B

BRADY, Journ. Roy. Micr. Soc., 1887, p. 897.—H. B. BRADY, PARKER, and JONES, Trans. Zool. Soc., vol. 12, 1888, p. 220, pl. 43, fig. 8.—ROBERTSON, Trans. Nat. Hist. Soc., Glasgow, vol. 3, pt. 3, 1892, p. 240.—EGGER, Abh. kön. bay. Akad. Wiss. München, Cl. II, vol. 18, 1893, p. 287, pl. 8, figs. 72, 78.—CHAPMAN, Proc. Zool. Soc., London, 1895, p. 22.—GOËS, Bull. Mus. Comp. Zoöl., vol. 29, 1896, p. 45.—FLINT, Rep. U. S. Nat. Mus., 1897 (1899), p. 291, pl. 37, fig. 4.—MILLETT, Journ. Roy. Micr. Soc., 1900, p. 278.—WHITEAVES, Geol. Survey Canada, 1901, p. 10.—SIDEBOTTOM, Mem. Proc. Manchester Lit. Philos. Soc., vol. 48, pt. 2, 1904, p. 12.—EARLAND, Journ. Quekett Micr. Club, ser. 2, vol. 9, 1905, p. 207.—BAGG, Proc. U. S. Nat. Mus., vol. 34, 1908, p. 134.—HERON-ALLEN and EARLAND, Journ. Roy. Micr. Soc., 1908, p. 332.—SIDEBOTTOM, Mem. Proc. Manchester Lit. Philos. Soc., vol. 54, pt. 3, 1910, p. 12.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 2, 1911, p. 86, figs. 139*a*, *b* (in text).—CHAPMAN, Zool. Res. *Endeavour*, pt. 3, 1912, p. 310.—HERON-ALLEN and EARLAND, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 63.—PEARCEY, Trans. Roy. Soc. Edinburgh, vol. 49, 1914, p. 1014.—CHAPMAN, Biol. Res. *Endeavour*, vol. 3, pt. 1, 1915, p. 20.—HERON-ALLEN and EARLAND, Journ. Roy. Micr. Soc., 1916, p. 42; Trans. Linn. Soc. London, vol. 11, ser. 2, 1916, p. 236.—MESTAYER, Trans. New Zealand Inst., vol. 48, 1916, p. 129.—SIDEBOTTOM, Journ. Roy. Micr. Soc., 1918, p. 123.—CUSHMAN, Bull. 100, U. S. Nat. Mus., vol. 4, 1921, p. 161, pl. 31, fig. 5.

Bulimina pupoides D'ORBIGNY, var. *spinulosa* WILLIAMSON, Rec. For. Great Britain, 1858, p. 62, pl. 5, fig. 128.

Bulimina presli REUSS, var. *aculeata* PARKER and JONES, Introd. Foram., 1862, Appendix, p. 311.

Description.—Test elongate, tapering, broadest near the apertural end, early portion with numerous long aculeate spines, later portion smooth; chambers fairly numerous, tumid, those of the early portion largely hidden by the numerous spines; sutures much depressed, wall calcareous, perforate, in the young specimens translucent, thin, in the older ones thickened and becoming opaque; aperture slightly curved, loop-like opening, in a slight depression of the ventral face of the chamber; color white.

Length 0.40–1.25 mm.

Distribution.—In the *Albatross* material from the western Atlantic this has occurred at a large number of stations, ranging from the cold water south of Nova Scotia down the coast to the region of Carolina. There is another group of stations in the northern part of the Gulf of Mexico and scattered stations in the Caribbean. Goës records it from the Caribbean also. Flint had it from off Panama, in the northern part of the Gulf of Mexico, and south of Nova Scotia. The *Challenger* records include one station off our eastern coast, off the West Indies, one off northwestern Africa, and another off the coast of Brazil. These range in depth from 150 to 2,740 fathoms (274 to 5,011 meters). Brady, Parker, and Jones record it from off the Abrohlos Bank in 40 to 260 fathoms (73 to 476 meters), and Pearcey from 2½ fathoms (4 meters) in Stanley Harbor, Falkland Islands. Whiteaves records it from the Gulf of St. Lawrence. It is known from numerous stations about the British Isles.

From the work of Heron-Allen and Earland this species does not seem to be common, although they record it at 12 stations, "but somewhat rare" off the west of Scotland in their Clare Island Report. They mention the following: "No very pronounced specimens of *Bulimina aculeata* occur in the area, but at four stations specimens were found, hispid from the whole of the initial portion of the test. . . . The spines of some of the specimens are short, but extremely fine and closely set, so that the apex of the shell is clothed with a prickly felt." In the western Atlantic there are small specimens occasionally found which have this same character, but whether they are the young of the typical form of the species or represent a different species or variety has been impossible to determine. Both forms seem to occur together. The finest large well-developed specimens have occurred in the cold water off our New England coast.

Bulimina aculeata—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperatures.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
16225	U.S.N.M.	7	D2003...	37 16 30 N.; 74 20 36 W..	641	....	....	Common.
16226	U.S.N.M.	3	D2022...	37 32 00 N.; 74 13 20 W..	487	40.0	bu. m.......	Few.
16227	U.S.N.M.	8	D2029...	39 42 00 N.; 70 47 00 W..	1,168	38.5	gy. m.......	Common.
16228	U.S.N.M.	5	D2035...	39 26 16 N.; 70 02 37 W..	1,362	....	glob. oz.....	Few.
16229	U.S.N.M.	5	D2048...	40 02 00 N.; 68 50 30 W..	547	39.0	crs.s.m.g...	Few.
16230	U.S.N.M.	2	D2078...	41 11 30 N.; 66 12 20 W..	499	40.0	gy. m. s.....	Rare.
16231	U.S.N.M.	1	D2084...	40 16 50 N.; 67 05 15 W..	1,290	40.0	bu. m. s.....	Rare.
16232	U.S.N.M.	1	D2112...	35 20 50 N.; 75 18 00 W..	16	73.5	s. blk. sp....	Rare.
16233	U.S.N.M.	1	D2150...	13 34 45 N.; 81 21 10 W..	382	45.8	wh. crs. s....	Rare.
16234	U.S.N.M.	4	D2172...	38 01 15 N.; 73 44 00 W..	568	39.0	gn. m.......	Few.
16235	U.S.N.M.	3	D2189...	39 49 30 N.; 70 26 00 W..	600	39.7	gn. m. s.....	Few.
16236	U.S.N.M.	6	D2192...	39 46 30 N.; 70 14 45 W..	1,060	38.6	gy. oz.......	Common.
16237	U.S.N.M.	1	D2196...	39 35 00 N.; 69 44 00 W..	1,230	38.0	gn. m.......	Rare.
16238	U.S.N.M.	10	D2202...	39 38 00 N.; 71 39 45 W..	515	39.1	gn. m.......	Common.
16239	U.S.N.M.	2	D2203...	39 34 15 N.; 71 41 15 W..	705	38.9	gn. m. s.....	Rare.
16240	U.S.N.M.	1	D2204...	39 30 30 N.; 71 44 30 W..	728	39.1	br. m.......	Rare.
16241	U.S.N.M.	6	D2212...	39 59 30 N.; 70 30 45 W..	428	40.0	gn. m.......	Few.
16242	U.S.N.M.	1	D2221...	39 05 30 N.; 70 44 30 W..	1,525	36.9	gy. oz.......	Rare.
16243	U.S.N.M.	1	D2228...	37 25 00 N.; 73 06 00 W..	1,582	36.8	br. m.......	Rare.
16244	U.S.N.M.	1	D2231...	38 29 00 N.; 73 09 00 W..	965	36.8	gy. oz.......	Rare.
16245	U.S.N.M.	6	D2262...	39 54 45 N.; 69 29 45 W..	250	41.6	gn. m. s.....	Common.
16246	U.S.N.M.	4	D2313...	32 53 00 N.; 77 53 00 W..	99	57.2	crs. s.......	Few.
16247	U.S.N.M.	4	D2377...	29 07 30 N.; 88 08 00 W..	210	67.0	gy. m.......	Few.
16248	U.S.N.M.	1	D2383...	28 32 00 N.; 88 06 60 W..	1,181	39.6	br. gn. m....	Rare.
16249	U.S.N.M.	5	D2385...	28 51 00 N.; 88 18 00 W..	730	40.1	gy. m.......	Few.
16250	U.S.N.M.	2	D2392...	28 47 30 N.; 87 27 00 W..	724	40.7	br. gy. m....	Rare.
16251	U.S.N.M.	4	D2393...	28 43 00 N.; 87 14 30 W..	525	41.1	lt. gy. m....	Few.
16252	U.S.N.M.	9	D2394...	28 38 30 N.; 87 02 00 W..	420	41.8	gn. m.......	Common.
16253	U.S.N.M.	3	D2395...	28 36 15 N.; 86 50 00 W..	347	44.1	gy. m.......	Few.
16254	U.S.N.M.	1	D2396...	28 34 00 N.; 86 48 00 W..	335	....	gy. m.......	Rare.
16255	U.S.N.M.	2	D2399...	28 44 00 N.; 86 18 00 W..	196	51.6	gy. m.......	Rare.
16256	U.S.N.M.	2	D2405...	28 45 00 N.; 85 02 00 W..	30	....	gy. s. brk. sh	Rare.
16257	U.S.N.M.	1	D2530...	40 53 30 N.; 66 24 00 W..	956	38.4	gy. oz.......	Rare.
16258	U.S.N.M.	1	D2534...	40 01 00 N.; 67 29 15 W..	1,234	37.8	gy. oz.......	Rare.
16259	U.S.N.M.	1	D2534...	....	....	....	....	....
16260	U.S.N.M.	8	D2547...	39 54 30 N.; 70 20 00 W..	390	39.6	gn. m.......	Common.
16261	U.S.N.M.	1	D2550...	39 44 30 N.; 70 30 45 W..	1,081	38.5	br. m.......	Rare.
16262	U.S.N.M.	4	D2581...	39 43 00 N.; 71 34 00 W..	394	....	gn. m.......	Few.
16263	U.S.N.M.	3	D2584...	39 06 30 N.; 72 23 20 W..	541	39.5	gy. m.......	Few.
16264	U.S.N.M.	6	D2677...	32 39 00 N.; 76 50 30 W..	478	39.3	gn. m.......	Common.
16265	U.S.N.M.	2	D2679...	32 40 00 N.; 76 40 30 W..	782	38.6	lt. gy. oz....	Rare.
16266	U.S.N.M.	10	D2680...	39 50 00 N.; 70 26 00 W..	555	....	....	Common.
16267	U.S.N.M.	8	D2689...	39 42 00 N.; 71 15 30 W..	525	....	gn. m.......	Common.
16268	U.S.N.M.	1	D2710...	40 06 00 N.; 68 01 00 W..	984	....	gn. m.......	Rare.
16269	U.S.N.M.	9	D2721...	38 56 00 N.; 72 11 30 W..	813	....	gy. oz.......	Common.
16270	U.S.N.M.	1	D2740...	37 40 00 N.; 73 50 00 W..	1,011	38.0	br. oz.......	Rare.
16271	U.S.N.M.	1	H60.....	17 39 00 N.; 65 44 00 W..	478	....	co. s. for.....	Rare.
16272	U.S.N.M.	1	H79.....	14 20 30 N.; 63 10 00 W..	821	....	co. s. sh. for.	Rare.
16273	U.S.N.M.	1	H80.....	13 56 35 N.; 63 02 60 W..	684	....	gy. m.for...	Rare.
16274	U.S.N.M.	8	H133....	11 33 20 N.; 66 19 00 W..	533	....	gy. m. for...	Common.

BULIMINA ECHINATA d'Orbigny.

Plate 15, fig. 6.

Bulimina echinata D'ORBIGNY, Ann. Sci. Nat., vol. 7, 1826, p. 269, No. 5.—FORNASINI, Boll. Soc. Geol. Ital., vol. 20, 1901, p. 176, fig. 2.—HERON-ALLEN and EARLAND, Trans. Linn. Soc. Zool., ser. 2, vol. 11, 1916, p. 235, pl. 41, fig. 3.

Heron-Allen and Earland refer to this species specimens from off the western coast of Ireland which they figure in the above reference. I have found nothing of the sort in the *Albatross* material in the western Atlantic.

BULIMINA ROSTRATA H. B. Brady.

Bulimina rostrata H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 408, pl. 51, figs. 14, 15.—EGGER, Abh. kön. bay. Akad. Wiss. München, Cl. II, vol. 18, 1893, p. 287, pl. 8, figs. 96, 97.—CHAPMAN, Proc. Zool. Soc., 1895, p. 23; Journ. Linn. Soc., vol. 30, 1910, p. 403.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 2, 1911, p. 87, figs. 140*a*, *b* (in text).—SIDEBOTTOM, Journ. Roy. Micr. Soc., 1918, p. 123.

Description.—Test ovoid, tapering to an acute point, sometimes with a distinct apical spine; chambers arranged triserially, but indistinct in front view; surface with a series of raised costae running from the apical end to the last-formed whorl, concealing the sutures; end view showing the sutures; wall punctate, opaque, white; aperture elongate, comma-shaped.

Length 0.3–0.5 mm.

Distribution.—The only Atlantic record is that given by Brady in the *Challenger* Report, off Cape de Verde Islands in 1,070 fathoms (1,957 meters). It is also recorded from *Challenger* station 335, latitude 32° 24′ S., longitude 13° 05′ W., in 1,450 fathoms (2,652 meters). Other records for this species are all from the Pacific and Indian Oceans. Brady records it southeast of the Cape of Good Hope and off the Ki Islands, Egger from the western coast of Australia, and Chapman from the Arabian Sea, the eastern coast of Australia, and off Funafuti, the latter in 2,298 fathoms (4,203 meters). I have previously recorded it from several *Albatross* and *Nero* stations in the North Pacific. Apparently this species does not come into the North Atlantic along the coasts, as it certainly would have been noted either in the European material or on our own eastern coast in the abundant *Albatross* material.

BULIMINA SQUAMMIGERA d'Orbigny.

Bulimina squammigera D'ORBIGNY, in Barker, Webb, and Berthelot, Hist. Nat. Isles Canaries, vol. 2, pt. 2, 1839. "Foraminifères," p. 137, pl. 1. figs. 22–24.—SIDDALL, Proc. Chester Soc. Nat. Sci., pt. 2, 1878, p. 49.—H. B. BRADY, Journ. Roy. Micr. Soc., 1887, p. 898.—EARLAND, Journ. Quekett Micr. Club, ser. 2, vol. 9, 1905, p. 107.—HERON-ALLEN and EARLAND, Journ. Roy. Micr. Soc., 1908, p. 333; Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 61; Journ. Roy. Micr. Soc., 1916, p. 43; Trans. Linn. Soc. Zool., ser. 2, vol. 11, 1916, p. 237.

This species figured and described by d'Orbigny from off the Canaries is recorded by Siddall and by Heron-Allen and Earland from about the British Isles. They do not, however, figure any specimens of the species, and this seems to be the only region from which it has been recorded. It has not occurred in the western Atlantic.

BULIMINA cf. B. SUBORNATA H. B. Brady.

Bulimina subornata H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 402, pl. 51, figs. 6*a*, *b*.—Chapman, Proc. Zool. Soc. London, 1895, p. 23.—Millett, Journ. Roy. Micr. Soc., 1900, p. 276, pl. 2, fig. 3.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 2, 1911, p. 88, figs. 141*a*, *b* (in text).

All of the records for this species are from the Pacific. There are, however, single specimens from two *Albatross* stations D2679, off the Carolina coast, in 782 fathoms (1,430 meters), and another off Ragged Key, Florida, in 75 fathoms (137 meters), which are smooth at the apertural end and more or less costate at the apical end, in general resembling this species.

Bulimina cf. B. subornata—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
17155	U.S.N.M.	1	D2679	32 40 00 N.; 76 40 30 W.	782	38.6	lt. gy. oz.	Rare.
17156	U.S.N.M.	1		Ragged Key, Fla.	75			Rare.

BULIMINA OVATA d'Orbigny.

Plate 21, fig. 3.

Bulimina ovata d'Orbigny, For. Foss. Vienne, 1846, p. 185, pl. 11, figs. 13, 14.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 400, pl. 50, figs. 13*a*, *b*.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 2, 1911, p. 77, figs. 125*a*–*c* (in text); Bull. 100, U. S. Nat. Mus., vol. 4, 1921, p. 164, fig. 4 (in text).

Description.—Test ovate in front view, circular or nearly so in end view, the apex broadly rounded; visible chambers several, little inflated; sutures but slightly compressed; wall smooth; aperture rather narrow with a plate-like tooth; color white.

Length 0.75–1.20 mm.

Distribution.—Specimens referred to this species are common, especially along the eastern coast of the United States, as well as in the Gulf of Mexico, and a few in the Caribbean. The specimens either vary considerably, or what is more likely from a study of a considerable series, there are two or more distinct forms in the area. One of these is short and broad, the other longer and more like the original figure given by d'Orbigny for this species.

Bulimina ovata—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
17222	U.S.N.M.	5	D2018...	37 13 22 N.; 74 20 04 W..	788	39.0	bu. m.......	Few.
17223	U.S.N.M.	10	D2029...	39 42 00 N.; 70 47 00 W..	1,168	38.5	gy. m.......	Common.
17224	U.S.N.M.	5	D2034...	39 27 10 N.; 69 56 20 W..	1,346	38.0	glob. oz......	Few.
17225	U.S.N.M.	10	D2035...	39 26 16 N.; 70 02 37 W..	1,362	....	glob. oz......	Common.
17226	U.S.N.M.	10	D2036...	38 52 40 N.; 69 24 40 W..	1,735	38.0	glob. oz......	Common.
17227	U.S.N.M.	8	D2037...	38 53 00 N.; 69 23 30 W..	1,731	38.0	glob. oz......	Common.
17228	U.S.N.M.	5	D2038...	38 30 30 N.; 69 08 25 W..	2,033	....	glob. oz......	Few.
17229	U.S.N.M.	2	D2039...	38 19 26 N.; 68 20 20 W..	2,369	....	glob. oz......	Rare.
17230	U.S.N.M.	10	D2041...	39 22 50 N.; 68 25 00 W..	1,608	38.0	glob. oz......	Common.
17193	U.S.N.M.	10	D2042...	39 33 00 N.; 68 26 45 W..	1,555	38.5	glob. oz......	Common.
17231	U.S.N.M.	10	D2043...	39 49 00 N.; 68 28 30 W..	1,467	38.5	glob. oz......	Common.
17232	U.S.N.M.	5	D2046...	40 02 49 N.; 68 49 00 W..	407	40.0	bu. m.......	Few.
17233	U.S.N.M.	6	D2050...	39 42 50 N.; 69 21 20 W..	1,050	44.5	glob. oz......	Common.
17234	U.S.N.M.	10	D2052...	39 40 05 N.; 69 21 25 W..	1,098	45.0	glob. oz......	Common.
17235	U.S.N.M.	8	D2063...	42 23 00 N.; 66 23 00 W..	141	46.0	s. crs. g......	Common.
17236	U.S.N.M.	2	D2076...	41 13 00 N.; 66 00 50 W..	906	....	bu. m.......	Rare.
17237	U.S.N.M.	1	D2097...	37 56 20 N.; 70 57 30 W..	1,917	....	glob. oz......	Rare.
17238	U.S.N.M.	10	D2105...	37 50 00 N.; 73 03 50 W..	1,395	41.1	glob. oz......	Common.
17239	U.S.N.M.	10	D2106...	37 41 20 N.; 73 03 20 W..	1,497	42.5	glob. oz......	Common.
17240	U.S.N.M.	10	D2144...	9 49 00 N.; 79 31 30 W..	896	....	gn. m.......	Common.
17241	U.S.N.M.	10	D2160...	23 10 31 N.; 82 20 37 W..	167	....	co..........	Common.
17242	U.S.N.M.	1	D2174...	38 15 00 N.; 72 03 00 W..	1,594	....	gy. m.......	Rare.
17243	U.S.N.M.	1	D2194...	39 43 45 N.; 70 07 00 W..	1,140	38.4	oz..........	Rare.
17244	U.S.N.M.	10	D2202...	39 38 00 N.; 71 39 45 W..	515	39.1	gn. m.......	Common.
17245	U.S.N.M.	1	D2205...	39 35 00 N.; 71 18 45 W..	1,073	38.1	gy. oz.......	Rare.
17246	U.S.N.M.	3	D2208...	39 33 00 N.; 71 16 15 W..	1,178	38.4	gn. m.......	Rare.
17217	U.S.N.M.	10	D2212...	39 59 30 N.; 70 30 45 W..	428	40.0	gn. m.......	Common.
17248	U.S.N.M.	3	D2228...	37 25 00 N.; 73 06 00 W..	1,582	36.8	br. m.......	Rare.
17194	U.S.N.M.	10	D2230...	38 27 00 N.; 73 02 00 W..	1,168	36.8	gy. oz.......	Common.
17195	U.S.N.M.	10	D2242...	40 15 30 N.; 70 27 00 W..	58	51.4	gn. m.......	Common.
17196	U.S.N.M.	10	D2249...	40 11 00 N.; 69 52 00 W..	53	51.4	gn. m. fne. s.	Common.
17197	U.S.N.M.	1	D2265...	37 07 40 N.; 74 35 40 W..	70	57.9	gn. m. g.....	Rare.
17198	U.S.N.M.	1	D2313...	32 53 00 N.; 77 53 00 W..	99	57.2	crs. s. bk. sp.	Rare.
17199	U.S.N.M.	1	D2381...	28 05 00 N.; 87 56 15 W..	1,330	....	lt. br. m....	Rare.
17200	U.S.N.M.	1	D2383...	28 32 00 N.; 88 06 00 W..	1,181	39.6	br. gn. m....	Rare.
17201	U.S.N.M.	1	D2384...	28 45 00 N.; 88 15 30 W..	910	39.6	br. gy. m....	Rare.
17202	....	5	D2385...	28 51 00 N.; 88 18 00 W..	730	40.1	gy. m.......	Few.
17203	U.S.N.M.	10	D2393...	28 43 00 N.; 87 14 30 W..	525	41.1	lt. gy. m....	Common.
17204	U.S.N.M.	5	D2394...	28 38 30 N.; 87 02 00 W..	420	41.8	gn. m.......	Few.
17205	U.S.N.M.	10	D2399...	28 44 00 N.; 86 18 00 W..	196	51.6	gy. m.......	Common.
17206	U.S.N.M.	10	D2400...	28 41 00 N.; 86 07 00 W..	169	....	gy. m.......	Common.
17207	U.S.N.M.	8	D2520...	42 41 00 N.; 64 55 30 W..	62	40.6	rky.........	Common.
17208	U.S.N.M.	5	D2535...	40 03 30 N.; 67 27 15 W..	1,149	37.8	gy. oz.......	Few.
17209	U.S.N.M.	2	D2547...	39 54 30 N.; 70 20 00 W..	390	39.6	gn. m.......	Rare.
17210	U.S.N.M.	10	D2562...	39 15 30 N.; 71 25 00 W..	1,434	37.3	gy. oz.......	Common.
17211	U.S.N.M.	10	D2563...	39 18 30 N.; 71 23 30 W..	1,422	37.4	gy. oz.......	Common.
17212	U.S.N.M.	5	D2564...	39 22 00 N.; 71 23 30 W..	1,390	37.3	gy. oz.......	Few.
17213	U.S.N.M.	6	D2568...	39 15 00 N.; 68 08 00 W..	1,781	36.9	gy. oz.......	Few.
17214	U.S.N.M.	1	D2573...	40 34 18 N.; 66 09 00 W..	1,742	37.3	gy. m. s.....	Rare.
17215	U.S.N.M.	2	D2581...	39 43 00 N.; 71 31 00 W..	394	....	gn. m.......	Rare.
17216	U.S.N.M.	4	D2706...	41 28 30 N.; 65 35 30 W..	1,188	....	gy. oz. for...	Few.
17217	U.S.N.M.	1	D2713...	38 20 00 N.; 70 08 30 W..	1,859	....	br. oz.......	Rare.
17218	U.S.N.M.	1	D2716...	38 29 30 N.; 70 57 00 W..	1,631	....	br. oz. for...	Rare.
17219	U.S.N.M.	1	D2747...	39 27 00 N.; 71 15 00 W..	1,276	37.5	bu. m.......	Rare.
17220	U.S.N.M.	8	D2748...	39 31 00 N.; 71 14 30 W..	1,163	37.8	gy. m. for...	Common.
17221	U.S.N.M.	1	....	Off Fowey Rocks, Fla., S. by E. ½ E..........	70	....	....	Rare.

BULIMINA PYRULA d'Orbigny.

Plate 20, fig. 1.

Bulimina pyrula D'ORBIGNY, For. Foss. Vienne, 1846, p. 184, pl. 11, figs. 9, 10.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 399, pl. 50, figs, 7-10.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 2, 1911, p. 78, figs. 126*a–c*, 127 (in text); Bull. 100, U. S. Nat. Mus., vol. 4, 1921, p. 162, figs. 1*a–c* (in text).

Description.—Test ovate in front view, usually broadest near the base, nearly circular in end view, the apex rounded; visible chambers few, very little inflated; sutures flush with the surface or very slightly depressed, wall smooth; aperture short and broad with a broad plate-like tooth partially closing the opening; color white.

Length 0.50–0.85 mm.

Distribution.—No extended list of references is given for this species, although they are very numerous. A comparison of the figures assigned to this species shows very considerable difference in the forms included under the name. I have restricted the records in the western Atlantic as far as possible to those forms which are broadest near the base and in which the later chambers reach to or almost to the apical end of the chamber. Such specimens are most common off the eastern coast of the United States, from Cape Hatteras to Nova Scotia, but scattered specimens which may be referred to this species occur farther south.

Bulimina pyrula—material examined.

Cat. No	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
17159	U.S.N.M.	1	D2035...	39 26 16 N.; 70 02 37 W..	1,362	....	glob. oz.....	Rare.
17160	U.S.N.M.	1	D2043...	39 49 00 N.; 68 28 30 W..	1,467	38.5	glob. oz.....	Rare.
17161	U.S.N.M.	4	D2050...	39 42 50 N.; 69 21 20 W..	1,050	44.5	glob. oz.....	Few.
17162	U.S.N.M.	4	D2052...	39 40 05 N.; 69 21 25 W..	1,098	45.0	glob. oz.....	Few.
17163	U.S.N.M.	2	D2063...	42 23 00 N.; 66 23 00 W..	141	46.0	s. crs. g.....	Rare.
17164	U.S.N.M.	1	D2073...	41 54 15 N.; 65 39 00 W..	587	40.0	gy. s........	Rare.
17165	U.S.N.M.	6	D2076...	41 13 00 N.; 66 00 50 W..	906	....	bu. m.......	Few.
17166	U.S.N.M.	7	D2078...	41 11 30 N.; 66 12 20 W..	499	40.0	gy. m. s.....	Common.
17167	U.S.N.M.	2	D2084...	40 16 50 N.; 67 05 15 W..	1,290	40.0	bu. m. s.....	Rare.
17168	U.S.N.M.	4	D2093...	39 42 50 N.; 71 01 20 W..	1,000	39.0	for. s. m.....	Few.
17169	U.S.N.M.	2	D2106...	37 41 20 N.; 73 03 20 W..	1,497	42.5	glob. oz.....	Rare.
17170	U.S.N.M.	10	D2111...	35 09 50 N.; 74 57 40 W..	938	....	gn. m.......	Common.
17171	U.S.N.M.	7	D2144...	9 49 00 N.; 79 31 30 W..	896	....	gn. m.......	Common.
17172	U.S.N.M.	1	D2160...	23 10 31 N.; 82 2– 37 W..	167	....	co..........	Rare.
17173	U.S.N.M.	1	D2187...	39 49 30 N.; 71 10 00 W..	420	39.7	gn. m. s.....	Rare.
17174	U.S.N.M.	1	D2196...	39 35 00 N.; 69 44 00 W..	1,230	38.0	gn. m.......	Rare.
17175	U.S.N.M.	4	D2203...	39 34 15 N.; 71 41 15 W..	705	38.9	gn. m. s.....	Few.
17176	U.S.N.M.	10	D2205...	39 35 00 N.; 71 18 45 W..	1,073	38.1	gy. oz.......	Common.
17177	U.S.N.M.	2	D2208...	39 33 00 N.; 71 16 15 W..	1,178	38.4	gn. m.......	Rare.
17178	U.S.N.M.	3	D2212...	39 59 30 N.; 70 30 45 W..	428	40.0	gn. m.......	Few.
17179	U.S.N.M.	1	D2217...	39 47 20 N.; 69 34 15 W..	924	38.1	gy. m.......	Rare.
17180	U.S.N.M.	1	D2221...	39 05 30 N.; 70 44 30 W..	1,525	36.9	gy. oz.......	Rare.
17181	U.S.N.M.	4	D2242...	40 15 30 N.; 70 27 00 W..	58	51.4	gn. m.......	Few.
17182	U.S.N.M.	5	D2247...	40 08 00 N.; 69 57 00 W..	67	52.4	gn. m. bk. sp.	Few.
17183	U.S.N.M.	8	D2249...	40 11 00 N.; 69 52 00 W..	53	51.4	gn. m. fne. s.	Common.
17184	U.S.N.M.	10	D2262...	39 54 45 N.; 69 29 45 W..	250	41.6	gn. m. s.....	Common.
17185	U.S.N.M.	9	D2352...	22 35 00 N.; 84 23 00 W..	463	45.0	wh. co......	Common.
17186	U.S.N.M.	4	D2531...	40 42 00 N.; 66 33 00 W..	852	38.4	gy. m.......	Few.
17187	U.S.N.M.	1	D2542...	40 00 15 N.; 70 42 20 W..	129	47.2	s. brk. sh....	Rare.
17188	U.S.N.M.	10	D2550...	39 44 30 N.; 70 30 45 W..	1,081	38.5	br. m.......	Common.
17189	U.S.N.M.	2	D2562...	39 15 30 N.; 71 25 00 W..	1,434	37.3	gy. oz.......	Rare.
17190	U.S.N.M.	1	D2566...	37 23 00 N.; 68 08 00 W..	2,620	36.4	gy. oz.......	Rare.
17191	U.S.N.M.	1	D2584...	39 05 30 N.; 72 23 20 W..	541	39.5	gy. m.......	Rare.
17192	U.S.N.M.	1	D2721...	33 56 00 N.; 72 11 30 W..	813	....	gy. oz.......	Rare.

BULIMINA PYRULA d'Orbigny, var. SPINESCENS H. B. Brady.

Plate 20, fig. 2.

Bulimina pyrula D'ORBIGNY, var. *spinescens* H. B. BRADY, Rep. Voy. *Challenger*, vol. 9, 1884, p. 400, pl. 50, figs. 11, 12.—FLINT, Rep. U. S. Nat. Mus., 1897 (1899), p. 290, pl. 37, fig. 1.—CHAPMAN, Trans. New Zealand Inst., vol. 38, 1905, p. 89.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 2, 1911, p. 78, figs 128*a–c*, 129 (in text); Bull. 100, U. S. Nat. Mus., vol. 4, 1921, p. 164, fig. 3 (in text).

Description.—Similar to the typical form of the species but with the broad apical end of the test beset with short spines.

Distribution.—Brady's original specimens of this variety were from the East Indies. Our specimens are like those figured by Flint, in which there are a few straight spines at the very base of the test. Such specimens are abundant in the cold water, especially off the New England coast. They are much like the spinose specimens figured by Parker and Jones.[23]

Bulimina pyrula, var. spinescens—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
17249	U.S.N.M	10	D2003...	37 16 30 N.; 74 20 36 W..	641	....	....	Common.
17250	U.S.N.M	3	D2022...	37 32 00 N.; 74 13 20 W..	487	40.0	bu. m.......	Few.
17251	U.S.N.M	3	D2043...	39 49 00 N.; 68 28 30 W..	1,467	38.5	glob. oz.....	Few.
17252	U.S.N.M	1	D2046...	40 02 49 N.; 68 49 00 W..	407	40.0	bu. m.......	Rare.
17253	U.S.N.M	2	D2084...	40 16 50 N.; 67 05 15 W..	1,290	40.0	bu. m. s.....	Rare.
17254	U.S.N.M	10	D2112...	35 20 50 N.; 75 18 00 W..	16	73.5	s. blk. sp....	Common.
17255	U.S.N.M	10	D2212...	39 59 30 N.; 70 30 45 W..	428	40.0	gn. m.......	Common.
17256	U.S.N.M	10	D2249...	40 11 00 N.; 69 52 00 W..	553	51.4	gn. m. fne. s..	Common.
17257	U.S.N.M	1	D2262...	39 54 45 N.; 69 29 45 W..	250	41.6	gn. m. s.....	Rare.
17258	U.S.N.M	10	D2377...	29 07 30 N.; 88 08 00 W..	210	67.0	gy. m.......	Common.
17259	U.S.N.M	1	D2398...	28 45 00 N.; 86 26 00 W..	227	48.6	gy. m.......	Rare.
17260	U.S.N.M	2	D2547...	39 54 30 N.; 70 20 00 W..	390	39.6	gn. m.......	Rare.
17261	U.S.N.M	1	D2614...	34 09 00 N.; 76 02 00 W..	168	....	gy. s. bk. sp..	Rare.
17262	U.S.N.M	10	D2247...	40 03 00 N.; 69 57 00 W..	67	52.4	gn. m. bk. sp.	Common.
17263	U.S.N.M	4	D2542...	40 00 15 N.; 70 42 20 W..	129	47.2	s. brk. sh....	Few.
17264	U.S.N.M	2	D2263...	37 08 00 N.; 74 33 00 W..	430	....	gn. m.......	Rare.
17265	U.S.N.M	1	D2244...	40 05 15 N.; 70 23 00 W..	67	52.9	gn. m.......	Rare.
17266	U.S.N.M	7	*Fish Hawk* 1108.....	40 02 00 N.; 70 37 30 W..	101	48.0	gy. m. fne. s.	Common.

BULIMINA AFFINIS d'Orbigny.

Plate 20, fig. 6.

Bulimina affinis D'ORBIGNY, in De la Sagra, Hist. Fis. Pol. Nat. Cuba, 1839, "Foraminifères," p. 105, pl. 2, figs. 25, 26.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 400, pl. 50, figs. 14*a*, *b*.—SHERBORN and CHAPMAN, Journ. Roy. Micr. Soc., 1886, p. 743, pl. 16, fig. 1.—BURROWS, SHERBORN, and BAILEY, Journ. Roy. Micr. Soc., 1890, p. 554, pl. 8, fig. 23.—WRIGHT, Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 473.—CHAPMAN, Journ. Roy. Micr. Soc., 1892, p. 756, pl. 12, fig. 10.—EGGER, Abh. kön. bay. Akad. Wiss. München, Cl. II, vol. 18, 1893, p. 285, pl. 8, fig. 71.—CHAPMAN, Proc. Zool. Soc. London, 1895, p. 22.—FLINT, Rep. U. S. Nat. Mus., 1897 (1899), p. 290, pl. 37, fig. 2.—MILLETT, Journ. Roy. Micr. Soc., 1900, p. 274.—CHAPMAN, Proc. California Acad. Sci., vol. 1, 1901, p. 244, pl. 29, fig. 4.—FORNASINI, Mem. Acad. Sci. Bologna, ser. 5, vol. 10, 1901, p. 16.—BAGG, Proc. U. S. Nat. Mus., vol. 34, 1908, p. 134.—HERON-ALLEN and EARLAND, Journ. Roy. Micr. Soc., 1908, p. 332.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 2, 1911, p. 79, fig. 130 (in text); Bull. 100, U. S. Nat. Mus., vol. 4, 1921, p. 165, figs. 5*a*, *b*, 6 (in text).

Description.—Test conical, tapering from the broadly rounded apertural end to the acutely pointed apical end; chambers numerous, inflated; sutures somewhat depressed, wall calcareous, smooth; aperture loop-shaped, rather short; color white.

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[23] Philos. Trans., vol. 155, 1865, pl. 15, figs. 8, 9.

Length about 0.75 mm.

This species originally described by d'Orbigny from the shore sands of Cuba is apparently found in the Gulf of Mexico and farther northward along our eastern coast. This and the following smooth species of *Bulimina* are not in a satisfactory state, and it should be determined by a study of abundant specimens as to whether they are very variable or whether there are numerous species which with close study can be distinguished.

Bulimina affinis—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
17267	U.S.N.M.	1	D2043...	39 49 00 N.; 68 28 30 W..	1,467	38.5	glob. oz......	Rare.
17141	U.S.N.M.	2	D2084...	40 16 50 N.; 67 05 15 W..	1,290	40.0	bu. m. s.....	Rare.
17142	U.S.N.M.	1	D2160...	23 10 31 N.; 82 20 37 W..	167	....	co............	Rare.
17143	U.S.N.M.	1	D2249...	40 11 00 N.; 69 52 00 W..	53	51.4	gn. m. fne. s.	Rare.
17144	U.S.N.M.	1	D2383...	28 32 00 N.; 88 06 00 W..	1,181	39.6	br. gn. m...	Rare.
17145	U.S.N.M.	1	D2393...	28 43 00 N.; 87 14 30 W..	525	41.1	lt. gy. m....	Rare.
17146	U.S.N.M.	1	D2394...	28 38 30 N.; 87 02 00 W..	420	41.8	gn. m.......	Rare.
17147	U.S.N.M.	1	D2396...	28 34 00 N.; 86 48 00 W..	335	....	gy. m.......	Rare.
17148	U.S.N.M.	1	D2534...	40 01 00 N.; 67 29 15 W..	1,234	37.8	gy. oz.......	Rare.
17149	U.S.N.M.	1	D2563...	39 18 30 N.; 71 23 30 W..	1,422	37.4	gy. oz.......	Rare.
17150	U.S.N.M.	2	....	Off Ragged Key, Fla.....	75	....	....	Rare.

BULIMINA FUSIFORMIS (Williamson).

Bulimina pupoides d'Orbigny, var. *fusiformis* Williamson, Rec. Foram. Great Britain, 1858, p. 63, pl. 5, figs. 129, 130.

Bulimina fusiformis H. B. Brady, Journ. Roy. Micr. Soc., 1887, p. 897.—Wright, Ann. Mag. Nat. Hist., ser. 6, vol. 4, 1889, p. 448; Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 473; Geol. Mag., dec. 4, vol. 7, 1900, p. 100, pl. 5, fig. 5.—Millett, Journ. Roy. Micr. Soc., 1900, p. 275, pl. 2, fig. 2.—Fornasini, Mem. Accad. Sci. Bologna, ser. 5, vol. 9, 1901, p. 157, pl. 0, figs. 6, 9, 16, 18, 23, 36, 40, 41.—Heron-Allen and Earland, Journ. Roy. Micr. Soc., 1908, p. 312; Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 61; Journ. Roy. Micr. Soc., 1916, p. 42; Trans. Linn. Soc. Zool., ser. 2, vol. 11, 1916, p. 235.

Description.—Test elongate, tapering, somewhat fusiform; chambers increasing in size and height as added, somewhat irregular, chambers comparatively few, distinct, irregularly spiral; sutures distinct, depressed, wall smooth, finely punctate; aperture ovate, small; color white.

Distribution.—Most of the Atlantic records for this species are about the British Isles. There are no specimens in the *Albatross* material which seem to be referable to this species.

BULIMINA PUPOIDES d'Orbigny.

Plate 20, fig. 3.

Bulimina pupoides D'ORBIGNY, For. Foss. Vienne, 1846, p. 185, pl. 11, figs. 13, 14.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 400, pl. 50, figs. 15*a*, *b*.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 2, 1911, p. 80, figs. 132*a–c* (in text); Bull. 100, U. S. Nat. Mus., vol. 4, 1921, p. 161, pl. 31, fig. 8.

Description.—Test ovate, broadest near the apertural end; apical end bluntly pointed, tapering; end view nearly circular; visible chambers numerous, much inflated; sutures rather deeply depressed, wall smooth; aperture long and narrow, with a narrow plate-like tooth; color white.

Length about 1 mm.

Distribution.—There are a few elongate specimens at scattered stations southward from Nantucket and two in the Gulf of Mexico. Some of these specimens might perhaps better be put under *B. elongata*, but the material has been very scanty. It has been recorded from the various parts of the Atlantic, as well as in other regions.

Bulimina pupoides—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
17151	U.S.N.M.	2	D2160...	23 10 31 N.; 82 20 37 W..	167	....	co...........	Rare.
17152	U.S.N.M.	1	D2205...	39 35 00 N.; 71 18 45 W..	1,073	38.1	gy. oz.......	Rare.
17153	U.S.N.M.	1	D2208...	39 33 00 N.; 71 16 15 W..	1,178	38.4	gn. m.......	Rare.
17154	U.S.N.M.	1	D2385...	28 51 00 N.; 88 18 00 W..	730	40.1	gy. m.......	Rare.

BULIMINA ELEGANS d'Orbigny.

Bulimina elegans D'ORBIGNY, Ann. Sci. Nat., vol. 7, 1826, p. 270, No. 10; Modèles, 1826, No. 9.—PARKER, JONES, and H. B. BRADY, Ann. Mag. Nat. Hist., ser. 3, vol. 16, 1865, p. 20, pl. 2, fig. 64.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 398, pl. 50, figs. 1–4; Journ. Roy. Micr. Soc., 1887, p. 898.—WRIGHT, Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 472.—EGGER, Abh. kön. bay. Akad. Wiss. München, Cl. II, vol. 18, 1893, p. 284, pl. 8, figs. 66, 67.—CHAPMAN, Proc. Zool. Soc., 1895, p. 22.—MORTON, Foram. Marine Clays of Maine, 1897, p. 115.—MILLETT, Journ. Roy. Micr. Soc., 1900, p. 274, pl. 2, fig. 1.—CHAPMAN, Proc. Cal. Acad. Sci., vol. 1, 1901, p. 244, pl. 29, fig. 3.—EARLAND, Journ. Quekett Micr. Club, ser. 2, vol. 9, 1905, p. 206.—CHAPMAN, Journ. Quekett Micr. Club, 1907, p. 127.—HERON-ALLEN and EARLAND, Journ. Roy. Micr. Soc., 1908, p. 333.—SIDEBOTTOM, Mem. Proc. Manchester Lit. Philos. Soc., vol. 54, pt. 3, p. 12.—CUSHMAN, Bull. 71, U.S. Nat. Mus., pt. 2, 1911, p. 82, figs. 134*a–c* (in text).—HERON-ALLEN and EARLAND, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 60; Journ. Roy. Micr. Soc., 1916, p. 42; Trans. Linn. Soc. London, vol. 11, ser. 2, 1916, p. 233.

Description.—Test elongate, tapering to the acutely pointed, sometimes mucronate, apical end; chambers numerous, inflated; sutures deeply depressed; wall calcareous, smooth; aperture short, broad, and rounded; color white.

Length 0.50–0.85 mm.

Distribution.—As far as the *Albatross* material from the western Atlantic goes, *B. elegans* is practically unknown, and is represented by the following variety. About the British Isles, however, there are numerous records for this species, but of these typical specimens, according to Heron-Allen and Earland, "are of somewhat infrequent occurrence." The only record from the western Atlantic is that given by Flint from off Block Island, *Albatross* station D2584, in 541 fathoms (989 meters). A reference to Flint's figure, however, will show that his specimens were variety *exilis* H. B. Brady.

BULIMINA ELEGANS d'Orbigny, var. EXILIS H. B. Brady.

Plate 17, figs. 7-12; plate 19, figs. 2, 3.

Bulimina elegans D'ORBIGNY, var. *exilis* H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 399, pl. 50, figs. 5, 6.—WRIGHT, Ann. Mag. Nat. Hist., vol. 4, ser. 6, 1889, p. 448.—PEARCEY, Trans. Nat. Hist. Soc. Glasgow, vol. 2, 1890, p. 176.—MILLETT, Journ. Roy. Micr. Soc., 1900, p. 275.—CHAPMAN, Journ. Linn. Soc. Zool., vol. 28, 1902, list, p. 400.—SIDEBOTTOM, Mem. Proc. Manchester Lit. Philos. Soc., vol. 54, No. 16, 1910, p. 12, pl. 1, fig. 11.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 2, 1911, p. 82, figs. 135a-c (in text).—HERON-ALLEN and EARLAND, Journ. Roy. Micr. Soc., 1916, p. 42; Trans. Linn. Soc. London, vol. 11, ser. 2, 1916, p. 234, pl. 41, figs. 4-9.

Bulimina elegans FLINT, Rep. U. S. Nat. Mus., 1897 (1899), p. 290, pl. 36, fig. 3.

Description.—Test elongate, slender, gradually tapering from the acute apical end to its greatest width near the apertural end; chambers numerous, triserial, apical end usually with a definite spine, chambers inflated, smooth; sutures depressed, distinct; aperture comma-shaped, small, in a slight depression of the surface.

Length 0.75 mm.

Distribution.—In his original description of this variety, Brady mentions that "such forms are by no means rare in deep water (1,000 to 1,500 fathoms, 1,829 to 2,743 meters) in the North Atlantic, and having also been met with in both the North and South Pacific (350 to 800 fathoms, 640 to 1,463 meters)." It is also recorded off the southwestern coast of Ireland, 1,000 fathoms (1,829 meters), rare (Wright); from both the warm and cool areas of the Faroe Channel (Pearcey), and off South Cornwall and west of Scotland (Heron-Allen and Earland). In the dredgings from the western Atlantic this species has been very common from numerous stations between the latitude of the Gulf of Maine south to Cape Hatteras, with one station off the Carolina coast. This is a definite localized area from which so many species have been found in the *Albatross* material in abundance but not farther south. One of the *Challenger* stations comes into this same area, as well as the station from which Flint records *Bulimina elegans*, but which is known to be the variety *exilis*.

There is very little variation in the specimens of this variety in this area.

Bulimina elegans, var. exilis—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		° *F.*		
16191	U.S.N.M.	6	D2003...	37 16 30 N.; 74 20 36 W..	641	....	....	Few.
16192	U.S.N.M.	2	D2022...	37 32 00 N.; 74 13 20 W..	487	40.0	bu. m.......	Rare.
16193	U.S.N.M.	1	D2036...	38 52 40 N.; 69 24 40 W..	1,735	38.0	glob. oz.......	Rare.
16194	U.S.N.M.	3	D2048...	40 02 00 N.; 68 50 30 W..	547	29.0	crs. s. m. g...	Few.
16195	U.S.N.M.	1	D2052...	39 40 05 N.; 69 21 25 W..	1,098	45.0	glob. oz.......	Rare.
16196	U.S.N.M.	10	D2078...	41 11 30 N.; 66 12 20 W..	499	40.0	gy. m. s......	Common.
16197	U.S.N.M.	4	D2084...	40 16 50 N.; 67 05 15 W..	1,290	40.0	bu. m. s.....	Few.
16198	U.S.N.M.	2	D2212...	39 59 30 N.; 70 30 45 W..	428	40.0	gn. m.......	Rare.
16199	U.S.N.M.	4	D2172...	38 01 15 N.; 73 44 00 W..	568	39.0	gn. m.......	Few.
16200	U.S.N.M.	1	D2189...	39 49 30 N.; 70 26 00 W..	600	39.7	gn. m. s......	Rare.
16201	U.S.N.M.	7	D2192...	39 46 30 N.; 70 14 45 W..	10,60	38.6	gy. oz.......	Common.
16202	U.S.N.M.	10	D2202...	39 38 00 N.; 71 39 45 W..	515	39.1	gn. m.......	Common.
16203	U.S.N.M.	7	D2203...	39 34 15 N.; 71 41 15 W..	705	38.9	gn. m. s......	Common.
16204	U.S.N.M.	4	D2204...	39 30 30 N.; 71 44 30 W..	728	39.1	br. m.......	Few.
16205	U.S.N.M.	1	D2205...	39 35 00 N.; 71 18 45 W..	1,073	38.1	gy. oz.......	Rare.
16206	U.S.N.M.	1	D2208...	39 33 00 N.; 71 16 15 W..	1,178	38.4	gn. m.......	Rare.
16207	U.S.N.M.	5	D2212...	39 59 30 N.; 70 30 45 W..	428	40.0	gn. m.......	Few.
16208	U.S.N.M.	1	D2217...	39 47 20 N.; 69 34 15 W..	924	38.1	gy. m.......	Rare.
16209	U.S.N.M.	2	D2231...	38 29 00 N.; 73 09 00 W..	965	36.8	gy. oz.......	Few.
16210	U.S.N.M.	10	D2262...	39 54 45 N.; 69 29 45 W..	250	41.6	gn. m. s......	Common.
16211	U.S.N.M.	2	D2528...	41 47 00 N.; 65 37 30 W..	677	38.7	br. s.......	Rare.
16212	U.S.N.M.	5	D2530...	40 53 30 N.; 66 24 00 W..	956	38.4	gy. oz.......	Few.
16213	U.S.N.M.	7	D2534...	40 01 00 N.; 67 29 15 W..	1,234	37.8	gy. oz.......	Common.
16214	U.S.N.M.	2	D2550...	39 44 30 N.; 70 30 45 W..	1,081	38.5	br. m.......	Rare.
16215	U.S.N.M.	1	D2568...	39 15 00 N.; 68 08 00 W..	1,781	36.9	gy. oz.......	Rare.
16216	U.S.N.M.	10	D2581...	39 43 00 N.; 71 34 00 W..	394	....	gn. m.......	Common.
16217	U.S.N.M.	10	D2584...	39 05 30 N.; 72 23 20 W..	541	39.5	gy. m.......	Common.
16218	U.S.N.M.	1	D2677...	32 39 00 N.; 76 50 30 W..	478	39.3	gn. m.......	Rare.
16219	U.S.N.M.	2	D2680...	39 50 00 N.; 70 26 00 W..	555	....	....	Rare.
16220	U.S.N.M.	2	D2689...	39 42 00 N.; 71 15 30 W..	525	....	gn. m.......	Rare.
16221	U.S.N.M.	1	D2705...	42 47 00 N.; 61 04 00 W..	1,255	....	lt. br. oz.....	Rare.
16222	U.S.N.M.	2	D2706...	41 28 30 N.; 65 35 30 W..	1,188	....	gy. oz. for....	Rare.
16223	U.S.N.M.	2	D2710...	40 06 00 N.; 68 01 00 W..	984	....	gn. m.......	Rare.
16224	U.S.N.M.	1	D2740...	37 40 00 N.; 73 50 00 W..	1,011	38.0	br. oz.......	Rare.

BULIMINA ELONGATA d'Orbigny.

Bulimina elongata D'ORBIGNY, For. Foss. Vienne, 1846, p. 187, pl. 11, figs. 19, 20.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 401, pl. 51, figs. 1, and 2(?).—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 2, 1911, p. 79, figs. 131*a–d* (in text); Bull. 100, U. S. Nat. Mus., vol. 4, 1921, p. 165.

Description.—Test elongate, subcylindrical, nearly circular in cross section; chambers numerous, inflated, short; sutures much depressed, apical end rounded, occasionally with minute spines, wall calcareous, smooth; aperture broad and rounded, with a broad platelike tooth, partially filling the opening; color white.

Length 0.50–1.00 mm.

Distribution.—There are a number of records for this species, mostly those given by Heron-Allen and Earland from about the British Isles. I have seen no material in the western Atlantic which I have been willing to refer to it.

BULIMINA MINUTISSIMA J. Wright.

Plate 17, figs. 5, 6.

Bulimina minutissima J. WRIGHT, Proc. Liverpool Geol. Soc., vol. 9, 1892, p. 190, pl. 13, figs. 9-12.—HERON-ALLEN and EARLAND, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 62, pl. 4, figs. 11, 12; Journ. Roy. Micr. Soc., 1916, p. 43; Trans. Linn. Soc. Zool., ser. 2, vol. 11, 1916, p. 237.

This small species described by Wright from Boulder clays of England has been recorded by Heron-Allen and Earland from the Clare Island region, off South Cornwall, and west of Scotland. I have seen no material on the American side.

Genus BULIMINELLA Cushman, 1911.

Bulimina (part) D'ORBIGNY, Foram. Amér. Mérid., 1839, p. 51.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 397.—CHAPMAN, The Foraminifera, 1902, p. 172.

Buliminella CUSHMAN (type, *Buliminella elegantissima* (d'Orbigny)), Bull. 71 U. S. Nat. Mus., pt. 2, 1911, p. 88.

Description.—Test composed of chambers triserially arranged, but in later development becoming involute and spirally coiled, the aperture being in the umbilicus thus formed; wall calcareous, perforate; aperture in the species but little twisted spirally, long and narrow, nearly vertical, in the closely spiral species becoming rounded in the middle of the concave umbilical area.

This genus was erected to include those species in which the spiral form of the test is very marked, all modifications of it with the peculiar aperture situated in the umbilical area, as in *B. subteres* (H. B. Brady), *B. declivis* (Reuss), and *B. contraria* (Reuss).

BULIMINELLA ELEGANTISSIMA (d'Orbigny), var. SEMINUDA (Terquem).

Plate 23, fig. 5.

Bulimina seminuda TERQUEM, Mém. Soc. géol. France, ser. 3, vol. 2, Mém. III, 1882, p. 117, pl. 12, fig. 21.

Bulimina elegantissima D'ORBIGNY, var. *seminuda* H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 403, pl. 50, figs. 23, 24.—DAKIN, Rep. Ceylon Pearl-Oyster Fisheries, vol. 5, 1906, p. 234.—HERON-ALLEN and EARLAND, Journ. Roy. Micr. Soc., 1908, p. 312.—CHAPMAN, Biol. Res. *Endeavour*, vol. 3, pt. 1, 1915, p. 18.

Description.—"This variety presents similar general features to *Bulimina elegantissima*, and exhibits the same regularly spiral mode of growth; but it differs from the typical form in its stouter build and in the greater obliquity of the segments. The shell-wall is usually thick, and the exterior is often partially striate or costate near the initial end."

Distribution.—Terquem described a species from the Eocene of the Paris Basin which Brady has placed as a variety, as noted above; Heron-Allen and Earland note it from the Eocene shore sands of

Essex, England. The best recent specimens seem to be from the South Pacific and Indian Ocean. Brady's Indo-Pacific specimens were off East Moncoeur Island, Bass Strait, 38 fathoms (70 meters); off Calpentyn, Ceylon, 2 fathoms (4 meters), and shore sands from Madagascar. From the Atlantic he had it from south of the Canaries, in 1,525 fathoms (2,789 meters), and less typical specimens from off St. Vincent, Cape de Verde Islands, 11 fathoms (20 meters), and two stations off the east coast of South America in 675 and 350 fathoms (1,234 and 640 meters).

I have a single specimen which may be referred to this form. It is from *Albatross* station D2358, in 222 fathoms (407 meters), in the Caribbean.

Other recent records are by Chapman from off Australia, 40 miles south of Cape Wiles, in 100 fathoms (183 meters), and from Ceylon (Dakin).

The recent specimens, especially the Atlantic ones, do not closely resemble Terquem's Eocene species as noted by Brady, and it is to be strongly suspected that our recent form may be separated from the Eocene one. I have not seen enough material to fully confirm this view.

Buliminella elegantissima, var. seminuda—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
16289	U.S.N.M.	1	D2358...	20° 19′ 00″ N.; 87° 03′ 30″ W..	222	°F.	fne. wh. co..	Rare.

BULIMINELLA CONVOLUTA (Williamson).

Plate 18, figs. 4, 5.

Bulimina pupoides D'ORBIGNY, var. *convoluta* WILLIAMSON, Rec. Foram. Great Britain, p. 63, pl. 5, figs. 132, 133.

Bulimina convoluta H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 408, pl. 113, figs. *6a*, *b*; Journ. Roy. Micr. Soc., 1887, p. 498.—GOËS, Köngl. Svensk. Vet. Akad. Handl., vol. 25, No. 9, 1894, p. 47.—MILLETT, Journ. Roy. Micr. Soc., 1900, p. 279, pl. 2, fig. 9.—CHAPMAN, Journ. Linn. Soc. Zool., vol. 28, 1902, p. 400.—BAGG, Bull. 513, U. S. Geol. Surv., 1912, p. 37, pl. 9, figs. *3a*, *b*.—HERON-ALLEN and EARLAND, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 63; Journ. Roy. Micr. Soc., 1916, p. 43.—SIDEBOTTOM, Journ. Roy. Micr. Soc., 1918, p. 124.

The recent records for this species described by Williamson from he British Isles are from that same region or from the Indo-Pacific. he British records include Shetland and Skye (Williamson), off toksund, 126 fathoms (231 meters), off Sartoröe, near Bergen, Nor-ray, 40 fathoms (73 meters) (Norman), and in the Clare Island region and south of Cornwall (Heron-Allen and Earland). Other recent records are Raine Island, Torres Strait (Brady), Malay Archipelago (Millett), Funafuti (Chapman), and the eastern coast of Australia (Sidebottom). It is to be suspected that there are two species involved here on account of what is known of other species having this very widely separated distribution. It evidently does not occur in the western Atlantic.

BULIMINELLA SUBTERES (H. B. Brady).

Plate 22, figs. 3–5.

Bulimina presli Reuss, var. *elegantissima* Parker and Jones, Philos. Trans., vol. 155, 1865, p. 374, pl. 15, figs. 12–17.

Bulimina elegantissima (var.) H. B. Brady, Ann. Mag. Nat. Hist., ser. 5, vol. 1, 1878, p. 436, pl. 21, fig. 12.

Bulimina subteres H. B. Brady, Quart. Journ. Micr. Sci., vol. 21, 1881, p. 55.—J. Wright, Proc. Belfast Nat. Field Club, 1880–81, App., p. 180, pl. 8, figs. 2, 2*a*.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 403, pl. 50, figs. 17, 18.—Balkwill and Wright, Trans. Roy. Irish Acad., vol. 28, 1885, p. 334.—H. B. Brady, Journ. Roy. Micr. Soc., 1887, p. 898.—J. Wright, Ann. Mag. Nat. Hist., ser. 6, vol. 4, 1889, p. 448.—Pearcey, Trans. Nat. Hist. Soc. Glasgow, vol. 2, 1890, p. 176.—Robertson, Trans. Nat. Hist. Soc. Glasgow, vol. 3, pt. 3, 1892, p. 240.—Egger, Abh. kön. bay. Akad. Wiss. München, Cl. II, vol. 18, 1893, p. 289, pl. 8, figs. 73, 74.—Goës, Kongl. Svensk. Vet. Akad. Handl., vol. 25, No. 9, 1894, p. 46, pl. 9, figs. 445–453.—Millett, Journ. Roy. Micr. Soc., 1900, p. 277.—Chapman, Journ. Linn. Soc. Zool., vol. 28, 1902, p. 400.—Sidebottom, Mem. Proc. Manchester Lit. and Philos. Soc., vol. 49, No. 5, 1905, p. 10.—Kiaer, in Duc d'Orleans, Crois. Grönland, 1905 (1907), p. 560.—Heron-Allen and Earland, Journ. Roy. Micr. Soc., 1908, p. 314.—Chapman, Rep. Foram. Subantarctic Ids., 1909, p. 330, pl. 14, fig. 10.—Sidebottom, Mem. Proc. Manchester Lit. Philos. Soc., vol. 54, pt. 3, 1910, p. 12.—Chapman, Journ. Linn. Soc. London, vol. 30, 1910, p. 403.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 2, 1911, p. 89, figs. 142*a*, *b* (in text).—Bagg, Bull. 513, U. S. Geol. Survey, 1912, p. 39, pl. 9, figs. 7*a–d*; pl. 11, figs. 1–5.—Heron-Allen and Earland, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 62, pl. 4, figs. 13, 14; Journ. Roy. Micr. Soc., 1916, p. 43; Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 236.—Sidebottom, Journ. Roy. Micr. Soc., 1918, p. 122.—Cushman, Bull. 100, U. S. Nat. Mus. vol. 4, 1921, p. 167.

Description.—Test elongate, ovate, fusiform, the initial end more pointed than the apertural end; chambers oblique, forming two or three irregularly spiral coils, inflated, increasing in size as added; sutures distinct, somewhat depressed; wall usually translucent, smooth, finely punctate; aperture a long, narrow, slightly curved slit at the edge of the ventral face of the chamber, often in a depressed umbilical area.

Length 0.4–0.6 mm.

Distribution.—Brady described this species from seven *Challenger* stations in the Atlantic well scattered over the area, and mentions in addition that it is known from northern regions as follows: From Davis Strait, off Nova Zembla, as well as from the Faroe Channel, the west coast of Scotland, and the north and west coasts of Ireland. Goës records it from off Spitzbergen, Greenland, and Norway, in 60 to 350 meters (33 to 191 fathoms), and Kiaer from off Greenland, in 300 meters (164 fathoms). From about the British Isles Heron-Allen and Earland record it from eight stations in the Clare Island region of western Ireland, rare off South Cornwall, and at nine stations west of Scotland.

In the *Albatross* dredgings it has occurred at several stations, mostly in the southern part of the area, south of Cape Hatteras, in the Gulf of Mexico and Caribbean Sea. In addition there are two stations south of Cape Cod on the Atlantic coast of the United States.

From this distribution and a comparison of the figures given by various authors and referred to this species it seems safe to say that the series should be carefully studied to see if only one species is present.

Our specimens from the *Albatross* dredgings are like those figured in the *Challenger* Report. There seems to be little if any deviation from this form. Apparently the species as Brady had it is present in the warmer waters of the western Atlantic, but not in the colder portion. Such forms as some of those figured by other authors, like the early figures of Parker and Jones, were not found in the western Atlantic material.

The species figured by Goës as "*Bulimina Normani* Goës" [24] from off Norway seems to be a short form related to *B. subteres*.

Buliminella subteres—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
16171	U.S.N.M.	1	D2037...	38 53 00 N.; 69 23 30 W..	1,731	38.0	glob. oz.....	Rare.
16172	U.S.N.M.	1	D2041...	39 22 50 N.; 68 25 00 W..	1,608	38.0	glob. oz.....	Rare.
16173	U.S.N.M.	1	D2117...	15 24 20 N.; 63 31 30 W..	683	39.8	yl. m. fne. s..	Rare.
16174	U.S.N.M.	1	D2140...	17 36 10 N.; 76 46 05 W..	966	39.7	s...........	Rare.
16175	U.S.N.M.	2	D2144...	9 49 00 N.; 79 31 30 W..	896	....	gn. m.........	Rare.
16176	U.S.N.M.	3	D2150...	13 34 45 N.; 81 21 10 W..	382	45.8	wh. crs. s....	Few.
16177	U.S.N.M.	1	D2400...	28 41 00 N.; 86 07 00 W..	169	....	gy. m.......	Rare.
16178	U.S.N.M.	1	D2641...	25 11 30 N.; 80 10 00 W..	60	69.2	co. s.........	Rare.
16179	U.S.N.M.	1	D2608...	30 58 30 N.; 79 38 30 W..	294	46.3	gy. s. dd. co.	Rare.
16180	U.S.N.M.	2	D2677...	32 39 00 N.; 76 50 30 W..	478	39.3	gn. m.......	Rare.
16181	U.S.N.M.	1	D2678...	32 40 00 N.; 76 40 30 W..	731	38.7	lt. gy. oz....	Rare.
16182	U.S.N.M.	2	D2679...	32 40 00 N.; 76 40 30 W..	782	38.6	lt. gy. oz....	Rare.
16183	U.S.N.M.	2	D2751...	16 54 00 N.; 63 12 00 W..	687	40.0	bu. glob. oz..	Rare.
16184	U.S.N.M.	3	D2754...	11 40 00 N.; 58 33 00 W..	880	38.0	glob. oz.....	Few.
16185	U.S.N.M.	5	H57.....	17 49 06 N.; 65 29 00 W..	2,188	....	oz. for.......	Few.
16186	U.S.N.M.	1	H59.....	17 42 10 N.; 65 39 40 W..	789	....	oz. for.......	Rare.
16187	U.S.N.M.	1	H60.....	17 39 00 N.; 65 44 00 W..	578	....	co. s. for.....	Rare.
16188	U.S.N.M.	1	H79.....	14 20 30 N.; 63 10 00 W..	821	....	co. s. sh. for..	Rare.
16189	U.S.N.M.	2	H80.....	13 56 35 N.; 63 02 00 W..	684	....	gy. m. for...	Rare.
16190	U.S.N.M.	2	H189....	17 42 30 N.; 74 40 00 W..	803	....	br. m. for...	Rare.

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[24] Köngl. Svensk. Vet. Akad. Handl., vol. 25, No. 9, 1894, p. 47, pl. 9, figs. 437, 438.

BULIMINELLA SUBTERES (H. B. Brady), variety.

Plate 22, fig. 6.

At a single station, *Albatross* D2761, off the east coast of South America, in 818 fathoms (1,483 meters), a specimen of this species was obtained which was thin and translucent and had the wall ornamented by numerous more opaque areas, giving a very ornate appearance to the test. Whether this is a constant feature or not the lack of specimens makes it impossible to determine.

Buliminella subteres, variety—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
16288	U.S.N.M.	1	D2761...	15 39 00 S.; 38 32 54 W..	818	39.0	pter. oz.....	Rare.

BULIMINELLA SUBCYLINDRICA (H. B. Brady).

Plate 20, fig. 5.

Bulimina subcylindrica H. B. Brady, Quart. Journ. Micr. Sci., vol. 21, 1881, p. 56; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 404, pl. 50, figs. 16*a*, *b*.—Egger, Abh. bay. Akad. Wiss. München, Cl. II, vol. 18, 1893, p. 289, pl. 8, fig. 100.—Chapman, Proc. Zool. Soc. London, 1895, p. 22.—Millett, Journ. Roy. Micr. Soc., 1900, p. 277, pl. 2, fig. 6.—Sidebottom, Journ. Roy. Micr. Soc., 1918, p. 122, pl. 3, fig. 7.

Description.—Test elongate, subcylindrical, the ends broadly rounded; chambers few, irregularly spiral, slightly inflated, last-formed one elongate; sutures distinct, but very slightly depressed; wall thin and translucent, finely perforate; aperture an elongate, nearly straight slit, vertical, on the inner face of the terminal chamber extending in from the margin.

Length 0.4–0.6 mm.

Distribution.—Brady originally had this species from three Atlantic stations, off Gomera, Canaries, 620 fathoms (1,140 meters), off the Cape de Verde Islands, 1,070 fathoms (1,957 meters), and off Pernambuco, Brazil, in 675 fathoms (1,234 meters).

Elsewhere the species is recorded from West Africa in 677 meters (369 fathoms) by Egger, although his figure is so poor that it can not be made out whether it should really be referred to this species or not. It is also recorded from the Arabian Sea (Chapman), Malay Archipelago (Millett), and off the east coast of Australia (Sidebottom).

It is allied to *B. subteres* Brady, but is very distinct in its general form and apertural characters.

Buliminella subcylindrica—*material examined.*

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″				
16281	U.S.N.M.	1	H79.....	14 20 30 N.; 63 10 00 W..	821	....	co. s. sh. for..	Rare.
16282	U.S.N.M.	1	H80.....	13 56 35 N.; 63 02 09 W..	684	....	gy. m. for...	Rare.

BULIMINELLA SPINIGERA, new species.

Plate 23, figs. 1–4.

Description.—Test fusiform, the initial end terminating in a single stout spine, apertural end rounded, composed of numerous chambers arranged in a twisted, elongate spiral, little if at all compressed, broadest near the apertural end; chambers numerous, elongate, indistinct; sutures indistinct, not depressed; wall very smooth and shining, slightly translucent; aperture large, irregularly oval, slightly pointed near the edge of the chamber; color white.

Length 0.40–0.85 mm.

Distribution.—Type-specimen (U.S.N.M. No. 16276) from *Albatross* station D2677, in 478 fathoms (873 meters), off the coast of North Carolina. Other specimens of the same species are from this same station, but it was not seen elsewhere in all the western Atlantic material examined.

By its peculiar shape, heavy spine at the initial end, glossy smooth surface, and large aperture, it is very different from the other species noted here. It is related to *B. elegantissima* d'Orbigny.

Buliminella spinigera—*material examined.*

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°*F.*		
16276	U.S.N.M.	3	D2677...	32 39 00 N.; 76 50 30 W..	478	39.3	gn. m.......	Rare.

Genus BULIMINOIDES Cushman, 1911.

BULIMINOIDES WILLIAMSONIANA (H. B. Brady).

Bulimina williamsoniana H. B. Brady, Quart. Journ. Micr. Soc., vol. 21, 1881, p. 56; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 408, pl. 51, figs. 16, 17.—Millett, Journ. Roy. Micr. Soc., 1900, p. 279, pl. 2, fig. 8.—Bagg, Proc. U. S. Nat. Mus., vol. 34, 1908, p. 136.—Heron-Allen and Earland, Trans. Zool. Soc. London, vol. 20, 1915, p. 641.

Buliminoides williamsoniana Cushman, Bull. 71, U. S. Nat. Mus., pt. 2, 1911, p. 90, fig. 144 (in text); Publ. 311, Carnegie Inst. Wash., 1922, p. 31, pl. 3, fig. 7.

Description.—Test elongate, subcylindrical, composed of numerous chambers which are not distinct from the surface, the main ornamentation of the surface consisting of longitudinal costae, usually somewhat spirally twisted, running from the initial end to the aperture; the aperture itself rounded, in the center of the oblique, apertural face; the costae of the surface running in to the center, making a radiate pattern about the aperture itself; color white.

Length of the Tortugas specimen 0.4 mm.

Distribution.—This species is one of the "finds" of the Tortugas collection. It has not previously been recorded from the Atlantic. Its distribution has been from shallow water of the Indo-Pacific region. Brady, in the *Challenger* Report, gave seven localities for this, as follows: "Port Stephens and Port Jackson, New South Wales, 2–10 fathoms; off Levuka, Fiji, 12 fathoms; off the New Hebrides, 125 fathoms; Torres Strait, 155 fathoms; Humboldt Bay, Papua, 37 fathoms; Nares Harbour, Admiralty Islands, 17 fathoms." Millett's specimens came from two stations in the Malay region. Bagg recorded this species from a single *Albatross* station, H4694, in 865 fathoms, off the Hawaiian Islands, and in 1911 I added another station, H2922, in 268 fathoms, off the same Islands. The other record is from the Kerimba Archipelago, off the eastern coast of Africa, where Heron-Allen and Earland recorded it. Its natural habitat is evidently in comparatively shallow water in tropical seas. It is a small species and one that is apt to be overlooked, and it may be fairly common in the Caribbean and the Gulf of Mexico, although it was certainly rare in the Tortugas region.

Genus VIRGULINA d'Orbigny, 1826.

Virgulina D'ORBIGNY (type, *V. squammosa* d'Orbigny), Ann. Sci. Nat., vol. 7, 1826, p. 267.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 413.—CHAPMAN, The Foraminifera, 1902, p. 172.—CUSHMAN, Bull. 71, U. S. Nat. Mus., vol. 71, pt. 2, 1911, p. 91.

Bulimina (part) BAILEY, Smithsonian Contr., vol. 2, 1851, p. 12.—PARKER and JONES, Ann. Mag. Nat. Hist., ser. 2, vol. 19, 1857, p. 296; Philos. Trans., vol. 155, 1865, p. 375.—WILLIAMSON, Rec. Foram. Great Britain, 1858, p. 63.

Description.—Test elongate, tapering, typically biserial, often becoming irregularly twisted in a spiral manner; chambers distinct; sutures usually depressed; wall calcareous, thin and translucent, in adults sometimes becoming thicker and opaque, perforate; aperture typically a comma-shaped opening with the narrow end coming to the base of the chamber; color white.

D'Orbigny's model of *Virgulina squammosa* shows a biserial test, more regular than some of the species now assigned to this genus, but forming a very good basis for the generic characters. It is closely related to *Bulimina*, especially in the apertural characters.

In the present oceans the genus has a wide distribution in both deep and shallow water. As a fossil it seems to be largely confined to the later Tertiary, from the Oligocene onward.

VIRGULINA SQUAMMOSA d'Orbigny.

Virgulina squammosa D'ORBIGNY, Ann. Sci. Nat., vol. 7, 1826, p. 267, No. 1: Modèles, No. 64.

VIRGULINA SUBSQUAMMOSA Egger.

Virgulina subsquammosa EGGER, Neues Jahrb. für Min., 1857, p. 295, pl. 12, figs. 19–21.

There are a great number of records for these two species from widely separated regions. The figures in the *Challenger* Report assigned to the latter of these includes several things, and it is difficult with records based on such an assemblage to place them without access to the originals. Both species were originally described from Tertiary deposits of Europe. I have not had specimens from the western Atlantic that I could satisfactorily assign to either of them.

VIRGULINA BRADYI, new species.

Plate 24, fig. 1.

Virgulina subsquammosa H. B. BRADY (part) (not Egger), Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 415, pl. 52, figs. 9*a*–*c* [7, 8?].

Description.—Test elongate, very slightly compressed, fusiform or somewhat tapering, initial end bluntly rounded, apertural end rounded; chambers biserially arranged, but somewhat twisted on the axis, comparatively few in number, inflated; sutures distinct, depressed; wall smooth; aperture elongate oval, the inner end broadest with a slight rim; color white.

Length 0.7–0.8 mm.

Distribution.—Type-specimen (U.S.N.M. No. 16287) from *Albatross* station D2568, in 1,781 fathoms (3,257 meters), southeast of Nantucket. There are four other stations for this species in this same general region, but it was not found to the southward. It is hard to determine where Brady's figured specimens were from, so the species must rest for the present on the records given here. A comparison of this with the original figures of *V. subsquammosa* given by Egger will show how different this species is in its subcylindrical shape, fewer chambers, and, in fact, in all its characters it is a very different species.

Virgulina bradyi—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
16283	U.S.N.M.	1	D2063...	42 23 00 N.; 66 23 00 W..	141	46.0	s. crs. g......	Rare.
16284	U.S.N.M.	1	D2093...	39 42 50 N.; 71 01 20 W..	1,000	39.0	for. s. m.....	Rare.
16285	U.S.N.M.	1	D2097...	37 56 20 N.; 70 57 30 W..	1,917	....	glob. oz.....	Rare.
16286	U.S.N.M.	1	D2534...	40 01 00 N.; 67 29 15 W..	1,234	37.8	gy. oz.......	Rare.
16287	U.S.N.M.	2	D2568...	39 15 00 N.; 68 08 00 W..	1,781	36.9	gy. oz.......	Rare.

VIRGULINA COMPRESSA (Bailey).

Plate 24, figs. 2, 3.

Bulimina compressa Bailey, Smithsonian Contrib., vol. 2, art. 3, 1851, p. 12, pl. 12, figs. 35–37.

Bulimina presli Reuss, var. (*Virgulina*) *schreibersii* (part) Parker and Jones, Philos. Trans., vol. 155, 1865, p. 375, pl. 17, fig. 72.

Virgulina schreibersiana Flint (not *V. schreibersiana* Czjzek), Rep. U. S. Nat. Mus., 1897 (1899), p. 291, pl. 37, fig. 6.

Description.—Test elongate, gradually tapering, slightly compressed, widest somewhat above the middle in the adult, apical end bluntly rounded; chambers comparatively few, inflated, oblique, distinct, arranged biserially, usually four or five on each side, the early chambers in the microspheric form arranged triserially; sutures distinct, depressed; wall smooth, fairly thick, finely punctate; aperture elongate oval, the narrow end near the border of the chamber; color white.

Length 0.6–1.0 mm.

Distribution.—Bailey's stations for this species are as follows: "F. No. 24, 49 fathoms (90 meters); latitude 39° 52′ 40″ N., longitude 72° 14′ 00″ W.; F. No. 25, 105 fathoms (193 meters); latitude 39° 41′ 10″ N., longitude 71° 43′ 00″ W.; G. No. 31, 50 fathoms (91 meters); latitude 39° 20′ 38″ N., longitude 72° 44′ 35″ W." These are southeast of Long Island. Flint's record for *V. schreibersiana*, which is clearly this species, is from *Albatross* D2263, off Chesapeake Bay, in 430 fathoms (787 meters). It has occurred in considerable numbers at several *Albatross* and *Fish Hawk* stations, all in this same general region. The only exception is a single station in the northern part of the Gulf of Mexico, and the specimens seem to be thinner and to have more chambers, so may be different.

Bailey's figure of this species is very clear and definite and represents well a specimen which is not quite adult. His description "shell elongated, somewhat pyramidal, slightly compressed laterally, aperture a long cleft without any very distinct margin," together with the very good figure, will serve to identify this species, especially as there is now available a large series from this general region. The specimens show little variation. The differences in the microspheric and megalospheric forms are marked by the triserial condition in the early chambers of the former, the biserial condition being assumed at once in the latter. The very white, shining, polished surface is very much like that of some Miliolidae. Altogether this is a very well-defined species when seen with abundant specimens.

Virgulina compressa—*material examined.*

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
16806	U.S.N.M.	1	D2111...	35 09 50 N.; 74 57 40 W..	938	....	gn. m.......	Rare.
16807	U.S.N.M.	1	D2174...	38 15 00 N.; 72 03 00 W..	1,594	....	gy. m.......	Rare.
16808	U.S.N.M.	6	D2242...	40 15 30 N.; 70 27 00 W..	58	51.4	gn. m.......	Common.
16809	U.S.N.M.	7	D2247...	40 03 00 N.; 69 57 00 W..	67	52.4	gn. m. bk. s.	Common.
16810	U.S.N.M.	8	D2249...	40 11 00 N.; 69 52 00 W..	58	51.4	gn. m. fne. s..	Common.
16811	U.S.N.M.	3	D2262...	39 54 45 N.; 69 29 45 W..	250	41.6	gn. m. s.....	Few.
16812	U.S.N.M.	1	D2265...	37 07 40 N.; 74 35 40 W..	70	57.9	gn. m. g.....	Rare.
16813	U.S.N.M.	4	D2377...	29 07 30 N.; 88 08 00 W..	210	67.0	gy. m.......	Few.
16814	U.S.N.M.	7	D2539...	39 59 45 N.; 70 53 00 W..	133	47.7	gn. s........	Common.
16815	U.S.N.M.	1	D2541...	39 57 45 N.; 70 50 30 W..	134	47.7	gn. s. brk. sh.	Rare.
16816	U.S.N.M.	5	D2542...	40 00 15 N.; 70 42 20 W..	129	47.2	s. brk. sh....	Common.
16817	U.S.N.M.	10	D2550...	39 44 30 N.; 70 30 45 W..	1,081	38.5	br. m.......	Common.
16818	U.S.N.M.	10	D2555...	39 53 00 N.; 71 32 00 W..	136	47.7	gn. m. s.....	Common.
			Fish Hawk.					
16819	U.S.N.M.	5	1108.	40 02 00 N.; 70 37 30 W..	101	48.0	gy. m. fne. s.	Few.
16820	U.S.N.M.	1	1110.	40 02 00 N.; 70 35 00 W..	100	47.0	gn. m. fne. s.	Rare.

VIRGULINA PUNCTATA d'Orbigny.

Virgulina punctata d'Orbigny, in De la Sagra, Hist. Fis. Pol. Nat. Cuba, 1839, "Foraminifères," p. 139, pl. 1, figs. 35, 36.—Cushman, Publ. 291, Carnegie Inst. Wash., 1919, p. 35; Proc. U. S. Nat. Mus., vol. 59, 1920, p. 52, pl. 11, fig. 15; Publ. 311, Carnegie Inst. Wash., 1922, p. 31, pl. 3, fig. 9.

This species described by d'Orbigny from shore sands of Cuba is recorded from the West Indies and is apparently widespread in shallow warm waters of this region. The specimen I previously recorded is from the north coast of Jamaica at Montego Bay. Fossil specimens are from the Miocene marl from the gorge of the Yumuri River, Matanzas, Cuba.

VIRGULINA SCHREIBERSIANA Czjzek.

Plate 26, fig. 6.

Virgulina schreibersiana Czjzek, Haidinger's Nat. Abhandl., vol. 2, 1848, p. 147, pl. 13, figs. 18-21.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 414, pl. 52, figs. 1-3.—Goës, Köngl. Svensk. Vet. Akad. Handl., vol. 25, No. 9, 1894, p. 48, pl. 9, figs. 459, 461-472.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 2, 1911, p. 94, figs. 148*a*, *b* (in text); Bull. 100, U. S. Nat. Mus., vol. 4, 1921, p. 169.

Bulimina presli Reuss, var. (*Virgulina*) *schreibersii* (part) Parker and Jones, Philos. Trans., vol. 155, 1865, p. 375, pl. 7, fig. 73 [pl. 15, fig. 18?].

Description.—Test elongate, slender, tapering, the initial end usually with a spine; chambers fairly numerous, inflated, distinct, rapidly increasing in size toward the apertural end; sutures distinct and depressed; wall thin and translucent, smooth, finely perforate; aperture elongate oval, fairly large for the size of the chamber.

Length usually about 0.5 mm.

Distribution.—In the *Albatross* dredgings specimens here referred to this species have occurred at several stations in the cold water off Nova Scotia, the New England coast, and south of Block Island. Two of the *Challenger* stations are in this same general region. There is a single specimen from another *Albatross* station in the Caribbean, south of Cuba, in over 700 fathoms (1,280 meters). The *Albatross* specimens are uniform in character and are like those figured in the above references.

An examination of the large number of figures referred to this species will show that either it is a very variable species or that numerous things are included under one name. This is especially true of the figures referred to *V. schreibersiana* from areas other than the North Atlantic. Whether the species here figured should be referred to Czjzek's species or not is another question. At any rate there is in the North Atlantic a very definite species of the form here figured. The figures given by Goës are very characteristic of this same form, as well as the one of Parker and Jones, referred to above. This was drawn from a North Atlantic specimen also. The rarity of the species in the *Albatross* dredgings from the Gulf of Mexico and Caribbean seems to indicate that it is typically a cold-water species, or at least this form of the species which is here figured.

There are numerous records for the waters about the British Isles which are probably this same form as it is figured by Goës from the Scandinavian region.

Virgulina schriebersiana—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
16161	U.S.N.M.	1	D2035...	39 26 16 N.; 70 02 37 W..	1,362	....	glob. oz.....	Rare.
16162	U.S.N.M.	2	D2052...	39 40 05 N.; 69 21 25 W..	1,098	45.0	glob. oz.....	Rare.
16163	U.S.N.M.	3	D2063...	42 23 00 N.; 66 23 00 W..	141	46.0	s. crs. g......	Few.
16164	U.S.N.M.	2	D2073...	41 54 15 N.; 65 39 00 W..	587	40.0	gy. s.........	Rare.
16165	U.S.N.M.	2	D2093...	39 42 50 N.; 71 01 20 W..	1,000	39.0	for. s. m.....	Rare.
16166	U.S.N.M.	1	D2335...	23 10 39 N.; 82 20 21 W..	204	....	....	Rare.
16167	U.S.N.M.	4	D2684...	39 35 00 N.; 70 54 00 W..	1,106	....	br. c. bk. sp.	Few.
16168	U.S.N.M.	2	D2614...	34 09 00 N.; 76 02 00 W..	168	....	gy. s. bk. sp.	Few.
16169	U.S.N.M.	1	D2720...	38 36 30 N.; 72 12 00 W..	1,509	....	gy. oz.......	Rare.
16170	U.S.N.M.	1	D2748...	39 31 00 N.; 71 14 00 W..	1,163	37.8	gy. m. for...	Rare.

VIRGULINA SUBDEPRESSA H. B. Brady.

Virgulina subdepressa H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 416, pl. 52, figs. 14-17.—EGGER, Abh. kön. bay. Akad. Wiss. München, Cl. II, vol. 18, 1893, p. 291, pl. 8, fig. 103.—CHAPMAN, Proc. Zool. Soc. London, 1895, p. 23.—GOËS, Bull. Mus. Comp. Zoöl., vol. 29, 1892, p. 47.—CHAPMAN, Journ. Linn. Soc. Zool., vol. 30, 1907, p. 31, pl. 4, fig. 78; 1910, p. 403.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 2, 1911, p. 93, figs. 147*a*, *b* (in text); Bull. 100, U. S. Nat. Mus., vol. 4, 1921, p. 170.

Description.—"Test elongate, subcylindrical, more or less compressed; oral end obtuse, rounded or subangular; aboral extremity broad and rounded; margin crenulate. Segments numerous, triangular in lateral aspect, slightly inflated; arranged in two inequilateral alternating series. Aperture an oblique or nearly erect loop-like slit, on the inner face of the final chamber.

Length, 1/25th inch (1 mm.)."

Distribution.—There are three Atlantic *Challenger* stations for this species, 35*c*, in 1,950 fathoms (3,566 meters), latitude 32° 15′ N., 65° 08′ W.; 332, in 2,200 fathoms (4,000 meters), latitude 37° 29′ S., longitude 27° 31′ W.; 346, in 2,350 fathoms (4,298 meters), latitude 2° 42′ S., longitude 14° 41′ W. Egger gives several records from different parts of the world. Chapman's records are from the Arabian Sea and off Funafuti. Goës records it from the eastern tropical Pacific. I recorded it from several Pacific stations, but have not had it from the western Atlantic, nor does it appear to be recorded from the region of the British Isles.

VIRGULINA TEXTURATA H. B. Brady.

Virgulina texturata H. B. BRADY, Rep. Voy *Challenger*, Zoology, vol 9, 1884, p. 415, pl. 52, figs. 6*a*, *b*.—EGGER, Abh. kön. bay. Akad. Wiss. München, Cl. II, vol. 18, 1893, p. 292, pl. 8, fig. 99.—CHAPMAN, Journ. Linn. Soc., vol. 30, 1910, p. 403.

Description.—"Test elongate, somewhat compressed, broadest near the oral end and tapering to a point at the aboral extremity; oral end obtuse or rounded; margin lobulated. Segments numerous, ventricose, arranged in two, inequilateral, regularly alternating series. Aperture a nearly erect loop-like slit on the inner face of the final segment.

Length, 1/20th inch (1.3 mm.)."

Distribution.—In the *Challenger* Report Brady described this species from three localities in the South Pacific, off Juan Fernandez in 1,375 and 1,825 fathoms (2,515 and 3,346 meters) and off the Ki Islands in 129 fathoms (236 meters). Egger records it from a *Gazelle* station off New Zealand in 2,769 meters (1,514 fathoms). Chapman's record is off Funafuti, in 2,298 fathoms (4, 203 meters). There are Atlantic records in the *Challenger* volumes on "Summary of Results" from the following stations: 70, in 1,675 fathoms (3,063 meters), latitude 38° 25′ N., longitude 35° 50′ W., and 346, in 2,350 fathoms (4,298 meters), latitude 2° 42′ S., longitude 14° 41′ W.

It is not recorded from the shallower waters of the eastern North Atlantic, nor have I found it in the *Albatross* or other collections from the western Atlantic.

VIRGULINA MEXICANA, new species.

Plate 23, fig. 8.

Description.—Test elongate, compressed, broadly fusiform, broadly rounded at the initial end, apertural end bluntly pointed; chambers few, rounded, not well distinguished from one another; sutures indistinct, not depressed; wall smooth and polished, translucent; aperture elongate, oval, broadest at its inner end, thence narrowing toward the edge of the chamber; color white.

Length 0.4–0.5 mm.

Distribution.—Type-specimen (U.S.N.M. No. 16277) from *Albatross* station D2395, in the Gulf of Mexico, in 347 fathoms (635 meters). It has also occurred at the adjacent station D2396 in 335 fathoms (613 meters).

This is a broad, somewhat compressed form, with rounded sides, very smooth surface, the chambers and sutures indistinct, and is unlike any of the others found in the collections from the western Atlantic.

Virgulina mexicana—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
16277	U.S.N.M.	1	D2395...	28 36 15 N.; 86 50 00 W..	347	44.1	gy. m.......	Rare.
16278	U.S.N.M.	1	D2396...	28 34 00 N.; 86 48 00 W..	335	....	gy. m.......	Rare.

VIRGULINA (?) ADVENA, new species.

Plate 25, figs. 1–3.

Description.—Test elongate, tapering, compressed, initial end bluntly rounded, apertural end very broadly rounded, semicircular, test broadest near the initial end, thence gradually tapering to the initial end, sides nearly straight; chambers few, irregularly biserial, rather indistinct; sutures somewhat indistinct, little if at all depressed; wall thin, translucent, smooth, finely punctate; aperture long and narrow, at the end of the final chamber; color white.

Length about 0.6 mm.

Distribution.—Type-specimen (U.S.N.M. No. 16280) from *Albatross* station D2713 in 1,859 fathoms (3,399 meters). The species also occurred at D2542 in 129 fathoms (236 meters).

This differs from other species of the genus in the peculiar form and especially the peculiar terminal aperture somewhat like that in *Bifarina*.

Virgulina advena—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
379	U.S.N.M.	1	D2542...	40 00 15 N.; 70 42 20 W..	129	47.2	s. brk. sh....	Rare.
280	U.S.N.M.	3	D2713...	38 20 00 N.; 70 08 30 W..	1,859	....	br. oz.......	Few.

VIRGULINA PAUCILOCULATA H. B. Brady.

Virgulina pauciloculata H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 414, pl. 52, figs. 4, 5.—Pearcey, Trans. Roy. Soc. Edinburgh, vol. 49, 1914, p. 1015.—Cushman, Bull. 100, U. S. Nat. Mus., vol. 4, 1921, p. 168.

Description.—"Test elongate, oval or subcylindrical, somewhat compressed, tapering slightly; ends rounded, aboral extremity mucronate. Segments few in number, long, erect, but little inflated, irregularly arranged. Aperture a curved loop, situated on the inner face of the final chamber.

Length, 1/60th inch (0.42 mm.)."

Distribution.—All the *Challenger* records for this species were from off New Guinea or near-by, as follows: Humboldt Bay, north coast of New Guinea, 37 and 28 fathoms (68 and 51 meters); Torres Strait, 3 to 11 fathoms (5 to 20 meters), and off the Ki Islands, 129 fathoms (236 meters). With this as the known distribution it is surprising to find the record given by Pearcey from the South Atlantic, *Scotia* station 459, in 1,998 fathoms (3,654 meters), latitude 41° 30′ S., longitude 9° 55′ W. This is, however, the distribution that some of the other Pacific species show, coming into the South Atlantic only.

Egger [25] records this species from several *Gazelle* stations, between Madeira and the Cape Verde Islands, the west coast of Africa, and off West Australia. The figures given by Egger are, however, not at all convincing as to the identity of his specimens with Brady's species, as they show two or three distinct things, and these rather obscurely.

VIRGULINA OBSCURA Goës.

Virgulina obscura Goës, Kongl. Svensk. Vet. Akad. Handl., vol. 25, No. 9, 1894, p. 48, pl. 9, figs. 457, 458.

This species of Goës from the coast of Norway and the North Sea can not be clearly identified. Goës's figures are very small. He includes in his synonymy *Virgulina texturata* H. B. Brady, which, as Brady's description is 10 years earlier, can hardly be pushed aside for this later name. The two do not seem at all alike. For present purposes it seems that *V. obscura* Goës should be pushed aside unless some species that can be identified with it in the region from which it was described can later be definitely placed,

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[25] Abh. bay. Akad. Wiss. München, Cl. II, vol. 18, 1893, p. 292, pl. 8, figs. 86-88, 94.

Subfamily 5. CASSIDULININAE.

This subfamily includes forms which are peculiarly constructed in that there is a combination of two distinct modes of growth. One of these, so usual in this family, is the biserial, which is here combined with a spiral or volute method. The combination of the two makes a complex test.

Two genera are common in the Atlantic, *Cassidulina* and *Ehrenbergina*, both of which are represented by several species.

Genus CASSIDULINA d'Orbigny, 1826.

Cassidulina D'ORBIGNY (type, *C. laevigata* d'Orbigny), Ann. Sci. Nat., vol. 7, 1826, p. 282.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 427.—CHAPMAN, The Foraminifera, 1902, p. 175.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 2, 1911, p. 95.

Burseolina SEGUENZA, Atti Accad. Lincei, ser. 3, vol. 6, 1880, p. 138.

Description.—Text complex, at least the early portion coiled, the chambers arranged biserially, alternating on the sides of the axis of coiling, chambers usually extending to the unbilicus on the sides, in some species the later portion of the test uncoiling; wall calcareous, perforate, usually smooth and without ornamentation; chambers numerous, the sutures usually distinct; aperture looplike, modified in breadth and length in the different species.

D'Orbigny's original description of the genus, while not complete, is, with the figure and model of *C. laevigata*, the type species, very clear.

Its relation to *Spiroplecta* is really close, the biserial chambers being placed alternately on the sides of the axis of coiling instead of forming a linear biserial series.

In the present-day oceans the genus is widely distributed and is one of those which extends into the very cold waters of the polar regions.

From the records it is mostly known as a fossil from the Tertiary but according to Chapman extends back to the Lower Cretaceous.

CASSIDULINA LAEVIGATA d'Orbigny.

Plate 24, fig. 4.

Cassidulina laevigata D'ORBIGNY, Ann. Sci. Nat., vol. 7, 1826, p. 282, pl. 15, figs. 4, 5; Modèles, 1826, No. 41.—WILLIAMSON, Rec. Foram. Great Britain, 1858, p. 68, pl. 6, figs. 141, 142.—PARKER and JONES, Philos. Trans., vol. 155, 1865, p. 377, pl. 15, figs. 1–4; pl. 17, fig. 64*a*, *b*, *c*.—DAWSON, Ann. Mag. Nat. Hist., vol. 5, 1870, p. 178; vol. 1, ser. 3, 1871, p. 198; vol. 7, ser. 4, 1871, list, p. 88.—BALKWILL and WRIGHT, Proc. Roy. Irish Acad., ser. 2, vol. 3, 1882, p. 447.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 428, pl. 54, figs. 1–3.—BALKWILL and WRIGHT, Trans. Roy. Irish Acad., vol. 28, 1885, p. 335.—H. B. BRADY, Journ. Roy. Micr. Soc., 1887, p. 900.—H. B. BRADY, PARKER, and Jones, Trans. Zool. Soc. London, vol. 12, 1888, p. 221, pl. 43, fig. 11.—Wright, Ann. Mag. Nat. Hist., ser. 6, vol. 4, 1889, p. 448; Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 475.—Pearcey, Trans. Nat. Hist. Soc. Glasgow, vol. 2, 1891, p. 177.—Robertson, Trans. Nat. Hist. Soc. Glasgow, vol. 3, pt. 3, 1892, p. 240.—Egger, Abh. kön. bay. Akad. Wiss. München, Cl. II, vol. 18, 1893, p. 302, pl. 7, figs. 47, 48, 54–56.—Goës, Köngl. Svensk. Vet. Akad. Handl., vol. 25, No. 9, 1894, p. 43, pl. 8, figs. 320–418.—Schlumberger, Mem. Soc. Zool., 1894, p. 239.—Chapman, Proc. Zool. Soc., 1895, p. 26.—Silvestri, Mem. Pont. Accad. Nuovi Lincei, vol. 12, 1896, p. 103, pl. 2, fig. 10.—Millett, Journ. Roy. Micr. Soc., 1901, p. 1.—Whiteaves, Geol. Survey Canada, 1901, p. 10.—Chapman, Trans. New Zealand Inst., vol. 38, 1905, p. 90.—Kiaer, In Duc d'Orleans, Croisière Océan, Mér. du Grönland, 1905 (1907), p. 560.—Sidebottom, Mem. Proc. Manchester Lit. Philos. Soc., vol. 49, No. 5, 1905, p. 16.—Rhumbler, Zool. Jahrb., Abth. Syst., vol. 24, 1906, p. 62.—Chapman, Rep. Foram. Subantarctic Ids., New Zealand, 1909, p. 332, pl. 15, fig. 1.—Sidebottom, Mem. Proc. Manchester Lit. Philos. Soc., vol. 54, pt. 3, 1910, p. 14.—Chapman, Journ. Linn. Soc., vol. 30, 1910, p. 405.—Awerinzew, Mem. Acad. Imp. Sci., St. Petersburg, ser. 8, vol. 29, No. 3, 1911, p. 18.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 2, 1911, p. 96, fig. 150*a*, *b* (in text).—Bagg, U. S. Geol. Survey, Bull. 513, 1912, p. 43, pl. 12, figs. 3*a*, *b*, 5*a–c*.—Heron-Allen and Earland, Proc. Roy. Irish Acad. vol. 31, pt. 64, 1913, p. 69.—Pearcey, Trans. Roy. Soc. Edinburgh, vol. 49, 1914, p. 1015.—Heron-Allen and Earland, Journ. Roy. Micr. Soc., 1916, p. 44; Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 240.—Mestayer, Trans. New Zealand Inst., vol. 48, 1916, p. 129.—Sidebottom, Journ. Roy. Micr. Soc., 1918, p. 128.—Cushman, U. S. Geol. Survey, Bull. 676, 1918, p. 9, pl. 1, fig. 5; Bull. U. S. Nat. Mus., vol. 4, 1921, p. 171, pl. 31, fig. 7.

Description.—Test nearly circular in outline, lenticular, or biconvex, usually much compressed, with a thin, acute peripheral border; chambers numerous, long, narrow, curved, surface smooth or nearly so; sutures distinct but not depressed; periphery often somewhat lobulated; wall calcareous, perforate, smooth; aperture a long, narrow slit, just below, and nearly parallel to the periphery of the test; color white.

Length 0.9 mm.

Distribution.—This and the following species are both very widely distributed, being known from both the Arctic and Antarctic and all the great ocean basins. In the Atlantic it is recorded from numerous stations off the British Isles, off Norway and Sweden, Spitzbergen, and Greenland. In the western Atlantic it occurs at several stations along the Atlantic coast of the United States, and is recorded from Gaspe Bay, Gulf of St. Lawrence, and off Labrador. Brady, Parker, and Jones record it from the Abrohlos Bank off Brazil, and Pearcey records it from Stanley Harbor, Falkland Islands, in 2¼ fathoms (4 meters), as well as in deep water in the same general region. It seems to be represented in rather shallow water in the Gulf of Mexico by a distinct variety, which is here described.

D'Orbigny's original figure and Modèle show a test without a definite carina, which is a form commonly found, especially in cold and deep waters.

Cassidulina laevigata—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
16362	U.S.N.M.	2	D2029...	39 42 00 N.; 70 47 00 W..	1,168	38.5	gy. m.......	Rare.
16363	U.S.N.M.	2	D2048...	40 02 00 N.; 68 50 30 W..	547	29.0	crs. s. m. g..	Rare.
16364	U.S.N.M.	2	D2106...	37 50 00 N.; 73 03 50 W..	1,395	41.0	glob. oz.....	Rare.
16365	U.S.N.M.	1	D2202...	39 38 00 N.; 71 39 45 W..	515	39.1	gn. m.......	Rare.
16366	U.S.N.M.	1	D2311...	32 55 00 N.; 77 54 00 W..	79	59.1	crs. s. bk. sp.	Rare.
16367	U.S.N.M.	1	D2355...	20 56 48 N.; 86 27 00 W..	399	....	yl. oz.......	Rare.
16368	U.S.N.M.	1	D2416...	31 26 00 N.; 79 07 00 W..	276	53.8	co. brk. sh..	Rare.
16369	U.S.N.M.	1	D2721...	38 56 00 N.; 72 11 30 W..	813	....	gy. oz.......	Rare.
......	J.A.C....	1	....	Coast of Ireland..........	......	....	....	Rare.

CASSIDULINA LAEVIGATA d'Orbigny, var. CARINATA, new variety.

Plate 25, figs. 6, 7.

Description.—Test differing from the typical in the thinner, more compressed test, with a very distinct thin carina, forming the periphery of the test.

Distribution.—Type-specimen (U.S.N.M. No. 16375*a*) from Ragged Key, Florida, in 75 fathoms (137 meters). This variety has occurred at several *Albatross* stations in the Gulf of Mexico, in the Caribbean Sea, and also off the coast of Florida in less than 100 fathoms (183 meters). In this region it seems to replace the typical form of the species.

Cassidulina laevigata, var. carinata—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
16370	U.S.N.M.	2	D2396...	28 34 00 N.; 86 48 00 W..	335	....	gy. m.......	Rare.
16371	U.S.N.M.	1	D2399...	28 44 00 N.; 86 18 00 W..	196	51.6	gy. m.......	Rare.
16372	U.S.N.M.	5	D2614...	34 09 00 N.; 76 02 00 W..	168	....	gy. s. bk. sp.	Few.
16373	U.S.N.M.	2	D2639...	25 04 50 N.; 80 15 10 W..	56	....	co. s........	Rare.
16374	U.S.N.M.	5	....	Off Key West, Fla.......	......	....	....	Few.
16375	U.S.N.M.	6	....	Ragged Key, Fla.........	......	....	....	Few.
16376	U.S.N.M.	1	....	Off Fowey Rocks, Fla...	......	....	....	Rare.

CASSIDULINA CRASSA d'Orbigny.

Plate 26, fig. 7.

Cassidulina crassa D'ORBIGNY, Foram. Amér. Mérid., 1839, p. 56, pl. 7, figs. 18-20; For. Foss. Vienne, 1846, p. 213, pl. 21, figs. 42, 43.—DAWSON, Ann. Mag. Nat. Hist., vol. 5, 1870, p. 178; ser. 3, vol. 1, 1871, p. 198; ser. 4, vol. 7, 1871, list p. 88.—BALKWILL and WRIGHT, Proc. Roy. Irish Acad., ser. 2, vol. 3, 1882, p. 447.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 429, pl. 54, fig. 5 (not fig. 4).—BALKWILL and WRIGHT, Trans. Roy. Irish Acad., vol. 28, 1885, p. 335.—H. B. BRADY, Journ. Roy. Micr. Soc., 1887, p. 901.—PEARCEY, Trans. Nat. Hist. Soc. Glasgow, vol. 2, 1890, p. 177.—WRIGHT, Proc. Roy. Irish Acad., vol. 1, ser. 3, 1891, p. 476.—EGGER, Abh. kön. bay. Akad. Wiss. München, Cl. II, vol. 18, 1893, p. 303, pl. 7, figs. 35, 36.—GOËS, Kongl. Svensk. Vet. Akad. Handl., vol. 25, No. 9, 1894, p. 43, pl. 8, figs. 421, 422.—EGGER, Nat. Ver. Passau, Jahr. 16, 1895, p. 19, pl. 9, fig. 19.—SILVESTRI, Mem. Pont. Accad. Nuovi Lincei, vol. 12, 1896, p. 104, pl. 2, figs. 11, 12.—Flint, Rep. U. S. Nat. Mus., 1897 (1899), p. 292, pl. 38, fig. 3.—Morton, Proc. Portland Soc. Nat. Hist., vol. 2, 1897, p. 116, pl. 1, fig. 12.—Millett, Journ. Roy. Micr. Soc., 1901, p. 2.—Whiteaves, Geol. Survey Canada, 1901, p. 10.—Kiaer, In Duc d'Orleans, Croisière Ocèan, Mèr du Grönland, 1905 (1907), p. 560.—Earland, Journ. Quekett Micr. Club, ser. 2, vol. 9, 1905, p. 209.—Bagg, Proc. U. S. Nat. Mus., vol. 34, 1908, p. 139.—Sidebottom, Mem. Proc. Manchester Lit. Philos. Soc., vol. 54, 1910, p. 14.—Chapman, Journ. Linn. Soc. London, vol. 30, 1910, p. 405.—Awerinzew, Mem. Acad. Imp. Sci., St. Petersburg, ser. 8, vol. 29, No. 3, 1911, p. 18.—Cushman Bull. 71, U. S. Nat. Mus., pt. 2, 1911, p. 97, fig. 151*a*, *b*, *c* (in text).—Heron-Allen and Earland, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 70.—Pearcey, Trans. Roy. Soc. Edinburgh, vol. 49, 1914, p. 1015.—Heron-Allen and Earland, Journ. Roy. Micr. Soc., 1916, p. 44; Trans. Linn. Soc. London, vol. 11, ser. 2, 1916.—Sidebottom, Journ. Roy. Micr. Soc., 1918, p. 128.—Cushman, Bull. 100, U. S. Nat. Mus., vol. 4, 1921, pl. 172.

Cassidulina laevigata d'Orbigny, var. *crassa* Parker and Jones, Philos. Trans. vol. 155, 1865, p. 377, pl. 15, figs. 5–7; pl. 17, fig. 64*d*.

Cassidulina obtusa Williamson, Rec. Foram. Great Britain, 1858, p. 69, pl. 6, figs. 143, 144.

Description.—Test subcircular, but oval in outline, biconvex, the peripheral border broadly rounded; chambers comparatively few, short, and inflated; wall calcareous, perforate, smooth; sutures distinct, somewhat depressed; aperture a long narrow slit just below and nearly parallel to the periphery of the test, often with a long tooth, partially filling the aperture; color white or light brown.

Length 0.60–1.0 mm.

Distribution.—Like the preceding species this is very widely distributed, but appears to be found more often in shallow water than *C. laevigata.* It is recorded from numerous stations off the British Isles, in the North Sea, off Greenland, and in the Gulf of the St. Lawrence. There are numerous stations in the *Albatross* material from the Atlantic coast of the United States and in the Gulf of Mexico. In shallow water, and especially in Casco Bay, Maine, a small thick form of the species occurs. This has a rougher surface than the typical form of deep water. In the examination of the Atlantic specimens I have had it is impossible to distinguish *C. crassa* from *C. oblonga.*

Cassidulina crassa—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
16377	U.S.N.M.	1	D2093...	39 42 50 N.; 71 01 20 W..	1,000	39	for. s. m.....	Rare.
16378	U.S.N.M.	3	D2117...	15 24 20 N.; 63 31 30 W..	683	39.8	yl. m. fne. s.	Few.
16379	U.S.N.M.	2	D2150...	13 34 45 N.; 81 21 10 W..	382	45.8	wh. crs. s....	Few.
16380	U.S.N.M.	1	D2242...	40 15 30 N.; 70 27 00 W..	58	51.4	gn. m.......	Rare.
16381	U.S.N.M.	1	D2265...	37 07 40 N.; 74 35 40 W..	70	57.9	gn. m. g.....	Rare.
16382	U.S.N.M.	1	D2398...	28 45 00 N.; 86 26 00 W..	227	48.6	gy. m.......	Rare.
16383	U.S.N.M.	6	D2614...	34 09 00 N.; 76 02 00 W..	168	....	gy. s. bk. sp.	Common.
16384	U.S.N.M.	2	D2639...	25 04 50 N.; 80 15 10 W..	56	....	co. s.........	Rare.
16385	U.S.N.M.	1	D2641...	25 11 30 N.; 80 10 00 W..	60	69.2	co. s.........	Rare.
16386	U.S.N.M.	1	D2668...	30 58 30 N.; 79 38 30 W..	294	46.3	gy. s. dd. co.	Rare.

CASSIDULINA OBLONGA Reuss.

Cassidulina oblonga Reuss, Denkschr. Akad. Wiss. Wien, vol. 1, 1850, p. 376, pl. 48, figs. 5, 6.—Egger, Neues Jahrb., 1857, p. 295, pl. 11, figs. 1-3.—Balkwill and Wright, Proc. Roy. Irish Acad., ser. 2, vol. 3, 1882, p. 447.—Egger, Abh. kön. bay. Akad. Wiss. München, Cl. II, vol. 18, 1893, p. 303, pl. 7, figs. 33, 34.—Chapman, Geol. Brit. Antarctic Exped., vol. 2, 1907-9, pp. 30, 43, 65, pl. 2, figs. 12*a*, *b*; Rep. Foram. Subantarctic Ids., 1909, p. 332; Journ. Linn. Soc. London, vol. 30, 1910, p. 405.

Description.—This species is evidently to be distinguished from *C. crassa* by the oblong outline, both in front and side views, and by the differences in the surface, which is much smoother and more finely punctate than *C. oblonga*. Brady combined these two species in *C. crassa*, and most of the subsequent records follow his determinations.

Distribution.—In the Atlantic *Cassidulina oblonga* is recorded by Balkwill and Wright as very rare off Dublin and Wicklow, Ireland. I have been unable to distinguish it in the Atlantic material that I have examined.

CASSIDULINA NITIDULA (Chaster).

Pulvinulina nitidula Chaster, First Rep. Southport Soc. Nat. Sci., 1891 (1892), p. 66, pl. 1, fig. 17.—Sidebottom, Mem. Proc. Manchester Lit. Philos. Soc. vol. 53, 1909, p. 9, pl. 4, fig. 2.

Cassidulina nitidula Heron-Allen and Earland, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 70, pl. 5, figs. 6-9; Journ. Roy. Micr. Soc., 1916, p. 44; Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 241.

Description.—"Test small, much depressed, highly polished; convolutions about two in number, there being seven or eight segments in the last; superior surface slightly convex; sutures not depressed; inferior surface concave; aperture large and oblique; periphery acute. Diameter 1.25 mm. The test is so thin that the sutures on the inferior surface are seen through the shell and give it a pseudo-cassiduline appearance."

"The curious 'engine-turned' appearance of the test, which is well exhibited in this figure (pl. 5, fig. 6), and also in Mr. Sidebottom's figure (pl. 4, fig. 2), is not due to the 'sutures of the inferior surface' being seen through the shell, as suggested by Doctor Chaster, or to the 'sutures on the superior and inferior surfaces being curved in opposite directions,[26] but to the existence of the inferior series of chambers. For greater clearness the chambers of the superior surface have been tinted in figures 6 and 7, the inferior chambers being plain."

Distribution.—I have not found this species in the *Albatross* material from the western Atlantic. According to the records it is known from Southport, England, from the Clare Island region of western Ireland, off south Cornwall, and west of Scotland. Sidebottom records it from the Mediterranean and from off Iceland, and

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[26] Millett, Trans. R. Geol. Soc. Cornwall, 1894.

Millett from the Pliocene of St. Erth in Cornwall. It has also been obtained at numerous stations in the North Sea by Earland, and is reported as common off Torbay in 30–50 fathoms (55–91 meters) by Heron-Allen and Earland.

The above description is the original of Doctor Chaster, and the notes that follow are from Heron-Allen and Earland as given in the synonomy.

CASSIDULINA SUBGLOBOSA H. B. Brady.

Plate 24, fig. 6.

Cassidulina subglobosa H. B. BRADY, Quart. Journ. Micr. Sci., vol. 21, 1881, p. 60; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 430, pl. 54, figs. 17*a–c*.—H. B. BRADY, PARKER, and JONES, Trans. Zool. Soc. London, vol. 12, 1888, p. 221, pl. 43, figs. 12–14.—PEARCEY, Trans. Nat. Hist. Soc. Glasgow, vol. 2, 1890, p. 177.—EGGER, Abh. kön. bay. Akad. Wiss. München, Cl. II, vol. 18, 1893, p. 304, pl. 7, figs. 41, 32, 52, 53.—CHAPMAN, Proc. Zool. Soc., 1895, p. 25.—GOËS, Bull. Mus. Comp. Zoöl., vol. 29, 1896, p. 49.—FLINT, Rep. U. S. Nat. Mus., 1897 (1899), p. 293, pl. 38, fig. 4.—CHAPMAN, Trans. New Zealand Inst., vol. 38, 1905, p. 90; Journ. Linn. Soc., vol. 30, 1907, p. 33, pl. 4, fig. 84; Geol. Brit. Antarctic Exped., vol. 2, 1907–9, pp. 31, 44, 65; pl. 2, fig. 14.—BAGG, Proc. U. S. Nat. Mus., vol. 34, 1908, p. 140.—CHAPMAN, Rep. Foram. Subantarctic Ids., New Zealand, 1909, p. 332; Journ. Linn. Soc., vol. 30, 1910, p. 405, pl. 54, fig. 3.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 2, 1911, p. 98, figs. 152*a–c* (in text).—BAGG, U. S. Geol. Survey Bull. 513, 1912, p. 44, pl. 12, figs. 2*a*, *b*, 4.—HERON-ALLEN and EARLAND, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 70.—PEARCEY, Trans. Roy. Soc. Edinburgh, vol. 49, 1914, p. 1015.—CHAPMAN, Biol. Res. *Endeavour*, vol. 3, pt. 1, 1915, p. 21.—HERON-ALLEN and EARLAND, Journ. Roy. Micr. Soc., 1916, p. 44; Trans. Linn. Soc. London, vol. 11, ser. 2, 1916, p. 241.—MESTAYER, Trans. New Zealand Inst., vol. 48, 1916, p. 129.—SIDEBOTTOM, Journ. Roy. Micr. Soc., 1918, p. 128.—CUSHMAN, Publ. 291, Carnegie Inst. Wash., 1919, p. 35; Proc. U. S. Nat. Mus., vol. 56, 1919, p. 606; Bull. 100, U. S. Nat. Mus., vol. 4, 1921, p. 171, pl. 32, fig. 2.

Description.—Test subglobular, inequilateral, with an oval outline, somewhat compressed on the two faces, peripheral border broadly rounded, slightly, if at all, lobulated; chambers comparatively few, inflated, wall calcareous, perforate, smooth; sutures slightly depressed, often indistinct; aperture fairly broad, short, loop-like or oval; color white or gray.

Diameter 0.50–1.00 mm.

Distribution.—This is a common species in comparatively deep water, and of very wide distribution. In the Atlantic it is recorded off the British Isles at numerous stations. Brady, Parker, and Jones record it from the Abrohlos Bank, and Pearcey records it from Stanley Harbor, Falkland Islands, in 2½ fathoms (4 meters), and at other southern stations in deep water. In the *Albatross* material it has occurred off the eastern coast of the United States, in the Gulf of Mexico, and in the Caribbean Sea. Off the coast of Florida specimens very similar in form, and probably belonging to this species, are found, but are of small size and the sutures more distinct than the typical adult specimens. These may be a small variety characteristic of shallow, warm water. It is more abundant at such stations than is the typical form in deep water.

Cassidulina subglobosa—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
16339	U.S.N.M.	1	D2063	42 23 00 N.; 66 23 00 W.	141	46	s. crs. g	Rare.
16340	U.S.N.M.	1	D2117	15 24 20 N.; 63 31 30 W.	683	39.8	yl. m. fne. s	Rare.
16341	U.S.N.M.	1	D2150	13 34 45 N.; 81 21 10 W.	382	45.8	wh. crs. s	Rare.
16342	U.S.N.M.	1	D2265	37 07 40 N.; 74 35 40 W.	70	57.9	gn. m. g	Rare.
16343	U.S.N.M.	9	D2311	32 55 00 N.; 77 54 00 W.	79	59.1	crs. s. bk. sp	Common.
16344	U.S.N.M.	1	D2312	32 54 00 N.; 77 53 30 W.	88	57.8	crs. s. bk. sp	Rare.
16345	U.S.N.M.	6	D2352	22 35 00 N.; 84 23 00 W.	463	45	wh. co	Common.
16346	U.S.N.M.	8	D2355	20 56 48 N.; 86 27 00 W.	399		yl. oz	Common.
16347	U.S.N.M.	2	D2358	20 19 00 N.; 87 03 30 W.	222		fne. wh. co	Few.
16348	U.S.N.M.	4	D2395	28 36 15 N.; 86 50 00 W.	347	44.1	gy. m	Few.
16349	U.S.N.M.	1	D2542	40 00 15 N.; 70 42 20 W.	129	47.2	s. brk. sh	Rare.
16350	U.S.N.M.	3	D2639	25 04 50 N.; 80 15 10 W.	56		co. s	Few.
16351	U.S.N.M.	1	D2643	25 25 00 N.; 79 55 15 W.	217	42.6	gy. s	Rare.
16352	U.S.N.M.	2	D2668	30 58 30 N.; 79 38 30 W.	294	46.3	gy. s. dd. co	Rare.
16353	U.S.N.M.	3	D2751	16 54 00 N.; 63 12 00 W.	687	40	bu. glov. oz	Few.
16354	U.S.N.M.	1	D2752	13 34 00 N.; 61 04 00 W.	281	48	bk. s	Rare.
16355	U.S.N.M.	2	D2754	11 40 00 N.; 58 33 00 W.	880	38	glob. oz	Rare.
16356	U.S.N.M.	2	D2756	3 22 00 S.; 37 49 00 W.	417	40.5	gy. sp. spk	Rare.
16357	U.S.N.M.	2	D2758	6 59 00 S.; 34 47 00 W.	20	79	brk. sh	Rare.
16358	U.S.N.M.	4	H79	14 20 30 N.; 63 10 00 W.	821		co. s. sh. for	Few.
16359	U.S.N.M.	3	H189	17 42 30 N.; 74 40 00 W.	803		br. m. for	Few.
16360	U.S.N.M.	1		Off Fowey Rocks, Fla.				Rare.
16361	U.S.N.M.	1		Off Key West, Fla.				Rare.

CASSIDULINA BRADYI Norman.

Plate 23, figs. 6, 7.

Cassidulina bradyi (Norman, MS.) J. Wright, Proc. Belfast Nat. Field Club, App., 1880, p. 152.—H. B. Brady, Quart. Journ. Micr. Sci., vol. 21, 1881, p. 59; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 431, pl. 54, figs. 6-9 (not fig. 10); Journ. Roy. Micr. Soc., 1887, p. 901.—J. Wright, Ann. Mag. Nat. Hist., ser. 6, vol. 4, 1889, p. 448; Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 476.—Pearcey, Trans. Nat. Hist. Soc. Glasgow, vol. 2, 1890, p. 177.—Goës, Köngl. Svensk. Vet. Akad. Handl., vol. 25, No. 9, 1894, p. 44, pl. 8, figs. 423–426.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 2, 1911, p. 99, fig. 153 (in text).—Heron-Allen and Earland, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 70; Journ. Roy. Micr. Soc., 1916, p. 44; Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 241.

Bulimina squammosa d'Orbigny, var. *subsquammosa* Goës (part), Köngl. Svensk. Vet. Akad. Handl., vol. 19, pt. 4, 1882, p. 69, pl. 4, figs. 111–113[?].

Description.—Test elongate, somewhat compressed, the early portion spirally coiled, later chambers forming an uncoiled biserial series; lateral faces convex; peripheral border thin, usually somewhat rounded; chambers fairly distinct, but the sutures not depressed; wall very finely perforate, smooth and polished, very white; aperture broad and short, loop-like or oval on the inner face of the chamber.

Length usually less than 0.5 mm.

Distribution.—From an examination of the collections from the Atlantic *Albatross* dredgings this species in its typical form occurs in the colder waters along our New England and Middle Atlantic coasts north of Cape Hatteras and somewhat southward. In this part of the Atlantic it has occurred at several stations ranging in depths from 53–2,512 fathoms (97–4,594 meters).

On the opposite side of the Atlantic the species is recorded from numerous stations, by Brady in the *Challenger* Report from *Porcupine* dredgings to the west and south of Ireland at depths of 90 to 1,630 fathoms (165 to 2,981 meters). It is also recorded off Ireland from 54 to 1,000 fathoms (99 to 1,829 meters) (J. Wright); from the "warm area" of the Faroe Channel (Pearcey); North Sea and coast of Norway 180 to 360 meters (98 to 197 fathoms) (Goës); a few specimens at two stations in the Clare Island region of western Ireland in 12 to 15 fathoms (21 and 27 meters), off South Cornwall, and west of Scotland (Heron-Allen and Earland).

From my own observations it seems that the uncoiled Cassidulinae of the tropical American waters represent an entirely different species.

A reexamination of the New Zealand specimens I recently recorded under this species [27] shows that they belong to another species, as was suggested at that time. This South Pacific or perhaps Indo-Pacific species may be known as *Cassidulina orientalis* Cushman, new species. It differs from *C. bradyi* Norman in the more compressed, broader form, less elongate test, and in the wall which in the Pacific species is rather distinctly punctate, the test not polished and shining white as in the North Atlantic species. Brady records this species from five stations in the South Pacific and also off Japan and the Philippines, areas which have a generally similar fauna. It is to be suspected that of the *Challenger* figures, plate 54, figure 10, may be from a specimen of Pacific origin, as it compares favorably with those I have had from off New Zealand. It is also to be suspected that the material of the following references may be *C. orientalis* Chapman [28] and Sidebottom.[29]

Sidebottom figures a specimen referred to *C. bradyi* from the coast of the Island of Delos,[30] which in its general appearance seems more nearly allied to *C. orientalis* than to *C. bradyi*. He also records it from the Bay of Palermo.[31]

The material which I have had from deep water in the North Pacific seems to be very close to typical *C. bradyi*, and it would be interesting to know the exact character of Chapman's specimens from very deep water off Funafuti in 2,107 and 2,715 fathoms (3,854 and 4,966 meters.[32]

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[27] Proc. U. S. Nat. Mus., vol. 56, 1919, p. 606.

[28] Proc. Zool. Soc. London, 1896, p. 25 (Arabian Sea), and Trans. New Zealand Inst., vol. 48, 1916, p. 429 (north coast of New Zealand, 98 fathoms (179 meters)).

[29] Journ. Roy. Micr. Soc., 1918, p. 128 (east coast of Australia).

[30] Mem. Proc. Manchester Lit. Philos. Soc., vol. 49, No. 5, 1905, p. 17, pl. 3, fig. 10.

[31] Idem., vol. 54, pt. 3, 1910, p. 14.

Goës records the species from the Caribbean,[33] but his specimens are not available and it is doubtful just what he had from his figures. Egger's figures [34] certainly do not represent this species.

Whatever may be the case elsewhere, certainly in the North Atlantic, off both the eastern and western coasts, typical *Cassidulina bradyi* is well-developed and very constant and well defined in its characters.

Cassidulina bradyi—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
16326	U.S.N.M	2	D2003...	37 20 42 N.; 74 17 36 W..	641	......	....	Few.
16327	U.S.N.M	1	D2111...	35 09 50 N.; 74 57 40 W..	938	......	gn. m.......	Rare.
16328	U.S.N.M	1	D2225...	36 05 30 N.; 69 51 45 W..	2,512	36.7	yl. oz........	Rare.
16329	U.S.N.M	9	D2262...	39 54 45 N.; 69 29 45 W..	250	41.6	gn. m. s......	Common.
16330	U.S.N.M	1	D2249...	40 11 00 N.; 69 52 00 W..	53	51.4	gn. m. fne. s .	Rare.
16331	U.S.N.M	1	D2542...	40 00 15 N.; 70 42 20 W..	129	47.2	S. brk. sh....	Rare.
16332	U.S.N.M	3	D2550...	39 44 30 N.; 70 30 45 W..	1,081	38.5	br. m.......	Few.
16333	U.S.N.M	1	D2639...	25 04 50 N.; 80 15 10 W..	56	......	co. s.........	Rare.
16334	U.S.N.M	1	D2694...	39 35 00 N.; 70 54 00 W..	1,106	......	br. c. bk. sp..	Rare.
16335	U.S.N.M	10	D2555...	39 53 00 N.; 71 32 00 W..	136	47.7	gn. m. s......	Common.
16336	U.S.N.M	1	D2539...	39 59 45 N.; 70 53 00 W..	133	47.7	gn. s........	Rare.
16337	U.S.N.M	3	D2542...	40 00 15 N.; 70 42 20 W..	129	47.2	s. brk. sh....	Few.
16338	U.S.N.M	2	D2544...	40 01 45 N.; 70 24 00 W..	131	47.7	gn. s. bk. sp..	Few.

CASSIDULINA BRAZILIENSIS, new species.

Plate 25, figs. 4, 5.

Description.—Test elongate, compressed, curved, early portion close-coiled, later portion loosely coiled, periphery much curved throughout; chambers comparatively few, slightly inflated, very distinct; wall thin and translucent, very finely perforate, smooth; sutures very clear and distinct, slightly depressed; aperture slightly elongate, comma-shaped, color whitish.

Length, 0.35–0.40 mm.

Distribution.—Type-specimen (U.S.N.M. No. 16387) from *Albatross* station D2756, off the coast of Brazil, 417 fathoms (763 meters). At this station several specimens were found, all of one general character. It has a peculiar curved test, differing from *C. bradyi* in form, as the later chambers are not entirely uncoiled, are more distinct, and the walls are thin and translucent. This has not been found elsewhere in the Atlantic material I have examined and may be peculiar to this region.

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[32] Journ. Linn. Soc., vol. 30, 1910, p. 406.

[33] Bull. Mus. Comp. Zoöl., vol. 29, 1896, p. 49.

[34] Abh. kön. bay. Akad. Wiss. München, Cl. II, 1893, pl. 7, figs. 38–40.

Cassidulina brasiliensis—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
16387	U.S.N.M.	4	D2756	3° 22′ 00″ S.; 37° 49′ 00″ W...	417	°F. 40.5	gy. sp. spk.	Few.

CASSIDULINA MEXICANA, new species.

Plate 24, fig. 5.

Description.—Test elongate, slightly if at all compressed, early portion close-coiled, later portion cylindrical; chambers comparatively few, inflated, distinct; wall thin and translucent, very finely perforate, smooth; sutures distinct, depressed; aperture elongate, broadly comma-shaped, in a large depressed area; color whitish.

Length, 0.50–0.65 mm.

Distribution.—Type-specimen (U.S.N.M. No. 16389) off Bell, Fowey Rocks, Florida, in 22 fathoms (40 meters). A specimen was also found from station H79, Caribbean Sea, 821 fathoms (1,488 meters).

This is somewhat nearer *C. bradyi* than the preceding species, as its later portion is decidedly uncoiled, but it is not compressed as in *C. bradyi*. The aperture, too, is in a more sunken area. The figures referred by Goës[35] to *Bulimina squammosa* d'Orbigny, var. *subsquammosa* Egger seem to be very like this species. His material was from the Carribbean.

His figures are referred to later by Goës himself in 1896[36] to *C. bradyi*. This evidently is a species replacing *C. bradyi* in the warm waters of the Gulf of Mexico and in the Caribbean area.

Cassidulina mexicana—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
16388	U.S.N.M.	1	H79	14° 20′ 30″ N.; 63° 10′ 00″ W..	821	°F.	co. s. sh. for.	Rare.
16389	U.S.N.M.	1	....	Off Bell, Fowey Rocks, Fla.	22	....	....	Rare.

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[35] Köngl. Svensk. Vet. Akad. Handl., vol. 19, No. 40, 1882, pl. 4, figs. 111–113.

[36] Bull. Mus. Comp. Zoöl., vol. 29, 1896, p. 49.

CASSIDULINA CALABRA (Seguenza).

Burseolina calabra SEGUENZA, Atti Accad. Lincei, ser. 3, vol. 6, 1880, p. 138, pl. 13, figs. 7*a*, *b*.

Cassidulina calabra H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 431, pl. 113, figs. 8*a*–*c*.—CHAPMAN, Proc. Zool. Soc., 1895, p. 25; Journ. Linn. Soc., vol. 30, 1910, p. 406.—BAGG, U. S. Geol. Survey Bull. 513, 1912, p. 42, pl. 12, figs. 1*a*–*c*.—PEARCEY, Trans. Roy. Soc. Edinburgh, vol. 49, 1914, p. 1016.—SIDEBOTTOM, Journ. Roy. Micr. Soc., 1918, p. 128, pl. 3, fig. 22.

Description.—Test generally rounded, close-coiled, chambers distinct but the sutures not depressed; apertural face concave, wall smooth, finely punctate; aperture a short, obliquely rounded slit; color whitish.

Diameter 0.4 mm.

Distribution.—The only record for the Atlantic for this species is that of Pearcey who records it from *Scotia* station 346 in 56 fathoms (102 meters), Burdwood Bank, south of the Falklands. It thus comes into the southern Atlantic area.

The species was recorded by Brady from Raine Island, Torres Straits, 155 fathoms (283 meters), and off Kandavu, Fiji Islands, 610 fathoms (1,114 meters), by Chapman off Funafuti in 2,400 fathoms (4,400 meters), and by Sidebottom from the east coast of Australia. Bagg records it from the Pliocene at San Pedro, Calif. Seguenza's material from the Miocene of Italy is, according to Brady, the same as this southern recent species.

CASSIDULINA PARKERIANA H. B. Brady.

Cassidulina parkeriana H. B. BRADY, Quart. Journ. Micr. Sci., vol. 21, 1881, p. 59; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 432, pl. 54, figs. 11–16.—EGGER, Abh. kön. bay. Akad. Wiss. München, Cl. II, vol. 18, 1893, p. 304, pl. 7, fig. 37.—CHAPMAN, Proc. Zool. Soc., 1895, p. 26; Journ. Quekett Micr. Club, 1907, p. 128, pl. 9, fig. 7; Geol. Brit. Antartic Exped., vol. 2, 1907–9, pp. 30, 43, 54, pl. 2, fig. 13.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 2, 1911, p. 100, figs. 154*a*–*c* (in text).—PEARCEY, Trans. Roy. Soc. Edinburgh, vol. 49, 1914, p. 1016.

Description.—Test elongate, cylindrical, the very early portion spirally coiled, the later chambers forming an uncoiled biserial series, making up the larger part of the test, circular in cross section; chambers broad and high, considerably inflated, wall calcareous, smooth; sutures much depressed; aperture very broad and short, occasionally subcircular, often with a broad toothlike plate nearly filling the opening; color, white.

Length 0.50–0.65 mm.

Distribution.—From the published records this seems to be a species of the Indo-Pacific. Brady's original specimens were from the west coast of Chile, and apparently the species extends northward, at least to the Galapagos, and thence to the Bering Sea. It has been recorded by Chapman from the Arabian Sea and off Australia and the Antarctic. The only Atlantic record is that of Pearcey, who records two specimens from *Scotia* station 346 in 56 fathoms (102 meters), Burdwood Bank, south of the Falkland Islands. Apparently it does not come into the North Atlantic in so far as the records or dredgings show.

Genus EHRENBERGINA Reuss, 1850.

Ehrenbergina Reuss (type, *E. serrata* Reuss), Denkschr. Akad. Wiss. Wien, vol. 1, 1850, p. 377.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 433.—Chapman, The Foraminifera, 1902, p. 179.—Cushman, Bull. 71, U. S. Nat Mus., pt. 2, 1911, p. 101.

Cassidulina (part) d'Orbigny, Foram. Amér. Mérid., 1839, p. 57.

Description.—Test free, early portion coiled, later portion uncoiled, composed of numerous chambers arranged biserially about an elongate axis, evenly united on the dorsal side but forming a deep groove on the ventral border, generally triangular in cross section; wall calcareous, perforate, smooth, or ornamented with spines or ridges; aperture elongate, curved, nearly at right angles to the edge of the chamber, with a slight lip.

The type species of the genus was described by Reuss from the Miocene of Baden, near Vienna. According to Chapman the records of the genus go back to the Lower Cretaceous. In the recent oceans the genus is represented by the following species with apparently definite distribution.

It seems very questionable whether any of the recent species can be referred to Reuss's fossil species, although this was done by Brady in the *Challenger* Report, and he has since been followed by later authors.

From the published records the distribution of this genus is largely in the Pacific and in the South Atlantic. The examination of the *Albatross* material shows this very strongly, no specimens of *Ehrenbergina* having been found north of Cape Hatteras in all the abundant material examined from that area. This distribution is confined to the region from south of Hatteras to the Caribbean and the coast of South America. It is also known from the Azores.

A comparison of the original figures of *E. serrata* of Reuss with the recent ones of Brady and others will show that our recent forms are very different from the fossil ones.

EHRENBERGINA SERRATA Reuss.

Ehrenbergina serrata Reuss, Denkschr. Akad. Wiss. Wien, vol. 1, 1850, p. 377, pl. 48, fig. 7.—Goës, Köngl. Svensk. Vet. Akad. Handl., vol. 25, no. 9, 1894, p. 44, pl. 8, figs. 428–430.—Cushman, Bull. 100, U. S. Nat. Mus., vol. 4, 1921, p. 172.

Description.—Test subcircular in front view, early portion close-coiled, uncoiling in later growth; chambers numerous, on the dorsal side close fitting, elongate and narrow, on the ventral side with a slight depression on the middle, wall smooth, punctate, the chambers slightly carinate and at the lateral margin extended into a short spinose angle; aperture elongate, curved, nearly at right angles to the edge of the chamber.

Length 0.50–0.55 mm.

Distribution.—This species which Reuss described from the Miocene of Baden in Vienna is apparently the same as that figured by Goës which he found in 400 meters (218 fathoms) off the Azores. I have not seen specimens of this kind either in the Pacific or Atlantic material that I have examined. Although most recent material is referred to this species of Reuss, it has seemed best to indicate at least three distinct species which have occurred in the material that I have been able to examine.

EHRENBERGINA BRADYI, new species.

Plate 26, fig. 5.

Ehrenbergina serrata H. B. Brady (part) (not Reuss), Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, pl. 55, figs. 6, 7 (not 2–5).—Cushman, Bull. 71, U. S. Nat. Mus., pt. 2, 1911, p. 101, figs. 155*a*–*b* [?].

Description.—Test triangular, tetrahedral, dorsal side curved, smooth; sutures flush, ventral side with a ventral groove along the middle, the angle of the chamber at the periphery extended into rounded, long horizontal spines, the ventral borders of the chambers with distinct carinal ridges, wall finely perforate, smooth; aperture elongated, curved, nearly at right angles to the border of the chamber; color whitish.

Length about 0.50 mm.

Distribution.—Type-specimen (U.S.N.M. No. 16394) from *Tuscarora* station 15° 22′ 41″ N., 171° 33′ W., in 1,874 fathoms (3,434 meters). This is the species which Brady figures in the *Challenger* Report as referred above. Although this seems to be common in the Pacific in deep water, it has not occurred in the *Albatross* Atlantic material unless a single specimen from station H59 in 789 fathoms (1,442 meters) can be referred to it. This is much more definitely triangular and carinate than the other specimens that I have seen from the Atlantic. This is the most ornate species of the genus except for *E. hystrix* H. B. Brady, which is also known from the Pacific region.

Ehrenbergina bradyi—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
16393	U.S.N.M.	1	H59.....	17 42 10 N.; 65 39 40 W.	789	....	oz. for.......	Rare.
16394	U.S.N.M.	1	*Tuscorora.*	15 22 41 N.; 171 33 00 W.	1,874	....	....	Rare.

EHRENBERGINA MESTAYERI, new species.

Ehrenbergina serrata Cushman (not Reuss), Proc. U. S. Nat. Mus., vol. 56, 1919, p. 607.

Description.—Test roughly triangular, apertural end broadly curved; chambers numerous, on the dorsal side smoothly fitting, on the ventral side coming together to form a raised smooth area, broadening toward the apertural end but extending to the initial end, apertural angles of the chamber with short, usually blunt, spines; sutures depressed on the ventral side, not at all depressed on the dorsal side; aperture an elongate curved slit, nearly at right angles to the inner margin of the chamber, somewhat more rounded and wider at the outer end; color white.

Length up to 0.50 mm.

Distribution.—Type-specimen collected by Mr. R. L. Mestayer off the Poor Knights Islands, east coast of New Zealand, latitude 35° 30′ S., longitude 174° 43′ E., dredged by H. M. S. *Hinemoa*. In the collection sent by Miss May and Mr. R. L. Mestayer to the United States National Museum there are a number of specimens from this locality, all of which show that these characters are very constant. They are especially marked by the truncated raised portion of the ventral side which is very distinct from any other species of recent *Ehrenbergina* that I have seen. There are numerous records for *E. serrata* in the general Australian region, but usually without figures, and it would be interesting to see how many of them are of this peculiar form. It has not occurred in the Atlantic material.

EHRENBERGINA TRIGONA Goës.

Plate 26, fig. 4.

Ehrenbergina serrata H. B. Brady (part) (not Reuss), Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 434, pl. 55, figs. 2-5 (not 6, 7).—Goës, Köngl. Svensk. Vet. Akad. Handl., vol. 19, no. 4, 1882, p. 83, pl. 6, figs. 183, 184.

Ehrenbergina serrata Reuss, var. *trigona* Goës, Bull. Mus. Comp. Zoöl., vol. 29, 1896, p. 49.

Description.—Test roughly triangular in front view, dorsal side slightly curved, or plane, ventral side usually with a row of angular projections of a double row, peripheral angles projected into a series of spines, one or more at each angle; chambers numerous, inflated somewhat on the ventral side; sutures distinct, very slightly if at all depressed on the dorsal side, more distinctly depressed on the ventral side, wall thin, translucent, finely perforate, smooth except for the spines; aperture elongate, curved, often with a slight lip extending in, nearly at right angles from the inner margin of the chamber; color whitish.

Length up to 0.75 mm.

Distribution.—Goës records this variety from 300 fathoms (549 meters) in the Caribbean as scarce, evidently based on his earlier 1882 work. He also records it from the Pacific in 1,201–1,322 fathoms (2,197–2,400 meters) as scarce. In the *Albatross* material I have examined from the Caribbean, Gulf of Mexico, and eastern coast of America specimens of this general form have occurred at three stations, D2117, 683 fathoms (1,249 meters), in the Caribbean; D2614, 18 fathoms (33 meters), south of Cape Hatteras, and D2644, 193 fathoms (353 meters), off the coast of Cuba. Specimens were rare in each case. These correspond fairly well with the figures given by Brady, quoted above, but the ventral side usually has a single instead of a double line of spinose angles.

Ehrenbergina trigona—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance
				° ′ ″ ° ′ ″		°F.		
16390	U.S.N.M.	2	D2117...	15 24 20 N.; 63 31 30 W..	683	39.8	yl. m. fne, s..	Few.
16391	U.S.N.M.	2	D2614...	34 09 00 N.; 76 02 00 W..	168	....	gy. s. bk. sp.	Few.
16392	U.S.N.M.	2	D2644...	25 40 00 N.; 80 00 00 W..	193	43.4	gy. s........	Few.

EHRENBERGINA TRIGONA Goës, var. BRAZILIENSIS, new variety.

Plate 26, figs. 1–3.

Description.—Test differing from the typical with a much more compressed form of the test, the whole being very thin and broad, the angles at the sides are well developed and spinose, usually with numerous short spines below the main one at the angle, the early portion of the test often covered with numerous short spinose projections, wall rather coarsely perforate, test translucent.

Distribution.—Type-specimen (U.S.N.M. No. 16395) from *Albatross* station D2756, 417 fathoms (763 meters), off the coast of Brazil. At this station the variety is rather common, all the specimens being very constant in their character and of this form. This evidently is a local variety developed in this particular region.

Ehrenbergina trigona, var. braziliensis—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
16395	U.S.N.M.	9	D2756...	3 22 00 S.; 37 49 00 W..	417	40.5	gy. sp. spk..	Common.

EHRENBERGINA PUPA (d'Orbigny).

Cassidulina pupa D'ORBIGNY, Foram. Amér. Mérid., 1839, p. 57, pl. 7, figs. 21–23.

Ehrenbergina pupa H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 433, pl. 55, figs. 1*a*, *b*; pl. 113, figs. 10*a–c*.

Description.—Test subtriangular, broader at the apertural end, bluntly pointed at the initial end, composed of comparatively few chambers, on the dorsal side smooth and rounded, the ventral side with a slight longitudinal depression; chambers inflated, distinct, wall fairly thin, finely punctate, smooth; sutures distinct, depressed, especially on the ventral side, not forming either spines or ridges; aperture elongate, curved, nearly at right angles to the edge of the chamber; color white.

Length 0.35 mm.

Distribution.—D'Orbigny originally described this species from the Falkland Islands; Brady in the *Challenger* Report records it from off the Azores, 450 fathoms (823 meters); off the mouth of the Rio de la Plata, 13 fathoms (23 meters), and off the Falkland Islands in 1,035 fathoms (1,895 meters). Pearcey records the species from *Scotia* station 342 in 1,946 fathoms (3,559 meters), 56° 54′ S., 56° 24′ W. Additional records elsewhere are off the coast of Chile, 120 and 175 fathoms (220 and 320 meters), dredged by the *Challenger*, and two records given by Chapman, one from the muds of the shores of the Ross Sea, the other off Funafuti, in 1,050 fathoms (1,920 meters). This then is evidently a species of southern waters, coming north into the central Atlantic at the Azores, if this more or less isolated record is correct.

I have failed to find the species at all in the *Albatross* material or other material from the Caribbean, Gulf of Mexico, or the eastern coast of the United States.

EXPLANATION OF PLATES.

PLATE 1.

FIG. 1. *Textularia candeiana*. ×30. D5318. Front view.
2. *Textularia candeiana*. ×64. Front view. (After Heron-Allen and Earland.)
3. *Textularia candeiana*. ×64. Edge view. (After Heron-Allen and Earland.)
4. *Textularia agglutinans*. ×30. D2358. Front view.
5. *Textularia agglutinans*. ×30. D2358. Front view.
6. *Textularia goësii*. ×25. D2150. Front view.
7. *Textularia luculenta*. ×30. D2150. Front view of adult.
8. *Textularia luculenta*. ×30. D2150. Side view.
9. *Textularia luculenta*. ×30. D2150. Front view of young.

PLATE 2.

FIG. 1. *Textularia abbreviata*? ×30. D2572. Front view.
2. *Textularia flintii*, var. *curta*. ×30. D2144. Front view.
3. *Textularia flintii*, var. *curta*. ×30. D2144. Front view.
4. *Textularia flintii*, var. *caroliniana*. ×30.
5. *Textularia albatrossi*. ×25. D2150. Front view.
6. *Textularia albatrossi*. ×25. D2150. Side view.
7. *Textularia concava*, var. *heterostoma*. ×64. Front view. (After Heron-Allen and Earland.)
8. *Textularia concava*, var. *heterostoma*. ×64. Edge view. (After Heron-Allen and Earland.)
9. *Textularia mexicana*. ×30. D2377. Front view.
10. *Textularia subplana*. ×30. D2641. Front view.
11. *Textularia floridana*. ×30. D2641. Front view.
12. *Textularia floridana*. ×30. D2641. Side view.
13. *Textularia foliacea*, var. *occidentalis*. ×30. D2318. Front view.

PLATE 3.

FIG. 1. *Textularia pseudoturris*. ×25. D2314. Front view.
2. *Verneuilina affixa*. ×30. D2383. Front view.
3. *Textularia barrettii*. ×25. Key West, Fla. Side view.
4. *Textularia barrettii*. ×25. Key West, Fla. Apertural view.
5. *Textularia barrettii*. ×25. Key West, Fla. Transverse section.
6. *Textularia barrettii*. ×15. Off Barbados. Front view.
7. *Bigenerina cylindrica*. ×30. Southwest of Ireland. Front view.
8. *Bigenerina cylindrica*. ×30. Southwest of Ireland. Front view.

PLATE 4.

FIG. 1. *Bolivina difformis*. *a*, front view; *b*, side view. (After Williamson).
2. *Bolivina laevigata*. Front view. (After Williamson.)
3. *Bolivina variabilis*. *a*, front view; *b*, side view. (After Williamson.)
4. *Spiroplecta fusca*. *a*, front view; *b*, side view; *c*, apertural view. (After Earland.)
5–8. *Spiroplecta wrightii*. Figs. 5–7, front view; Fig. 8, side view. ×65. (After Heron-Allen and Earland.)

PLATE 5.

FIG. 1. *Textularia pseudotrochus*. ×30. D2641. Front view.
2. *Textularia pseudotrochus*. ×30. D2641. Dorsal view.
3. *Textularia pseudotrochus*. ×30. D2641. Ventral view.
4. *Bigenerina pennatula*. ×25. D2150. Front view.
5. *Textularia conica*. ×30. D2639. Front view.
6. *Textularia conica*. ×30. D2639. Dorsal view.
7. *Textularia conica*. ×30. D2639. Apertural view.
8. *Bigenerina nodosaria*, var. *textularioidea*. ×25. D2315. Front view.
9. *Bigenerina nodosaria*, var. *textularioidea*. ×25. D2315. Front view.
10. *Bigenerina capreolus*. ×25. D2355. Front view.

PLATE 6.

FIG. 1. *Textularia parvula*. ×100. H79. Front view of microspheric specimen.
2. *Textularia parvula*. ×100. D2398. Front view of megalospheric specimen.
3. *Textularia catenata*. ×75. D2713.
4. *Bolivina albatrossi*. ×75. D2677. Front view.
5. *Bolivina goësii*. ×75. D2641. Front view.
6. *Bolivina robusta*, var. ×100. D2150. Front view.

PLATE 7.

FIG. 1. *Bolivina punctata*. ×75. D2150. Front view.
2. *Bolivina porrecta*. ×100. D2150. Front view.
3. *Bolivina limbata*. ×75. D2758. Front view.
4. *Bolivina pulchella*. ×100. Tortugas, Fla., 6 fathoms. Front view.
5. *Bolivina subspinescens*. ×75. D2192. Front view.
6. *Bolivina subaenariensis*. ×75. D2262. Front view.

PLATE 8.

FIG. 1. *Bolivina subaenariensis*, var. *mexicana*. ×75. D2377. Front view.
2. *Bolivina quadrilatera*. ×75. D2144. Front view.
3. *Bolivina beyrichi*, var. *alata*. ×75. D2249. Front view.
4. *Gaudryina apicularis*. ×75. D2093. Front view.
5. *Gaudryina*, cf. *G. convexa*. ×75. D2641. Front view.

PLATE 9.

FIG. 1. *Bolivina inflata*. ×200. Front view. (After Heron-Allen and Earland.)
2. *Bolivina inflata*. ×200. Front view. (After Heron-Allen and Earland.)
3. *Bolivina inflata*. ×200. Front view. (After Heron-Allen and Earland.)
4. *Bolivina inflata*. ×200. Edge view. (After Heron-Allen and Earland.)
5. *Bolivina tortuosa*. ×75. Front view. (After Heron-Allen and Earland.)
6. *Bolivina beyrichi*. ×150. Front view. (After Heron-Allen and Earland.)
7–9. *Verneuilina advena*. ×120. Front view. (After Heron-Allen and Earland.)
10. *Verneuilina propinqua*. ×25. D2394. Side view.
11. *Verneuilina propinqua*. ×25. D2394. Front view.

PLATE 10.

FIG. 1. *Cuneolina angusta*. ×15. Off Barbados. Front view.
2. *Cuneolina angusta*. ×15. Off Barbados. Front view.
3. *Cuneolina angusta*. ×15. Off Barbados. Apertural view.
4. *Verneuilina affixa*. ×30. D2383. Front view.
5. *Verneuilina arenacea*. Front view. (After Williamson.)
6. *Verneuilina arenacea*. Rear view. (After Williamson.)

PLATE 11.

FIG. 1. *Verneuilina bradyi.* ×30. D2395. Front view.
2. *Valvulina oviedoiana.* ×30. Lisbon Creek Reef, Bahamas. Front view.
3. *Valvulina oviedoiana.* ×30. Lisbon Creek Reef, Bahamas. Front view.
4. *Valvulina oviedoiana.* ×30. Lisbon Creek Reef, Bahamas. Apertural view.
5. *Valvulina oviedoiana.* ×30. Lisbon Creek Reef, Bahamas. Front view.
6. *Gaudryina scabra.* ×25. D2751. Front view.
7. *Gaudryina scabra.* ×25. D2751. Front view.
8. *Valvulina conica.* ×30. D2547. Dorsal view.
9. *Valvulina conica.* ×30. D2547. Side view.

PLATE 12.

FIG. 1. *Gaudryina flintii.* ×25. D2678. Front view.
2. *Gaudryina flintii.* ×25. D2678. Front view.
3. *Gaudryina rudis.* ×35. Front view. (After Heron-Allen and Earland.)
4. *Gaudryina rudis.* ×35. Front view. (After Heron-Allen and Earland.)
5. *Gaudryina rudis.* ×35. Front view. (After Heron-Allen and Earland.)
6. *Gaudryina rudis.* ×35. Apical view, showing three initial chambers laid open. (After Heron-Allen and Earland.)
7. *Gaudryina chilostoma.* ×30. D2416. Front view.
8. *Gaudryina bradyi.* ×30. D2046. Front view.

PLATE 13.

FIG. 1. *Gaudryina atlantica.* ×20. D2399. Front view.
2. *Gaudryina atlantica.* ×20. D2399. Front view.
3. *Gaudryina atlantica.* ×20. D2399. Apertural view.
4. *Gaudryina baccata*, var. *novangliae.* ×30. D2105. Front view.
5. *Gaudryina pseudofiliformis.* ×30. D2352. Front view.

PLATE 14.

FIG. 1. *Gaudryina curta.* ×25. D2739. Front view.
2. *Gaudryina curta.* ×25. D2739. Front view.
3. *Gaudryina curta.* ×25. D2739. Front view.
4. *Gaudryina curta.* ×25. D2739. Front view.

PLATE 15.

FIG. 1. *Tritaxilina caperata*, var. *atlantica.* ×25. D2150. Front view.
2. *Tritaxilina caperata*, var. *atlantica.* ×25. D2150. Front view.
3–5. *Clavulina nodosaria*, var. *novangliae.* ×30. D2247. Front view.
6. *Bulimina echinata.* ×113. Front view. (After Heron-Allen and Earland.)
7. *Clavulina flintiana.* ×30. D2425. Front view.
8. *Clavulina flintiana.* ×30. D2425. Front view.
9. *Clavulina flintiana.* ×30. D2425. Apertural view.

PLATE 16.

FIG. 1. *Clavulina humilis*, var. *mexicana.* ×25. D2399. Front view.
2. *Clavulina humilis*, var. *mexicana.* ×25. D2399. Front view.
3. *Clavulina humilis*, var. *mexicana.* ×25. D2399. Front view.
4. *Clavulina communis.* ×25. D2377. Front view.
5. *Clavulina communis.* ×25. D2377. Front view.
6. *Clavulina obscura.* ×75. Front view. (After Heron-Allen and Earland.)

PLATE 17.

FIG. 1. *Clavulina occidentalis.* ×30. D2383. Front view.
2. *Clavulina occidentalis.* ×30. D2383. Front view.
3. *Clavulina tricarinata.* ×30. D2388. Front view.
4. *Clavulina tricarinata.* ×30. Off Bell, Fowey, Fla. Front view.
5. *Bulimina minutissima.* ×120. Ventral view. (After Heron-Allen and Earland.)
6. *Bulimina minutissima.* ×120. Dorsal view. (After Heron-Allen and Earland.)
7. *Bulimina elegans*, var. *exilis.* ×113. (After Heron-Allen and Earland.)
8. *Bulimina elegans*, var. *exilis.* ×113. (After Heron-Allen and Earland.)
9. *Bulimina elegans*, var. *exilis.* ×113. (After Heron-Allen and Earland.)
10–12. *Bulimina elegans*, var. *exilis.* ×113. (After Heron-Allen and Earland.)

PLATE 18.

FIG. 1. *Clavulina communis*, var. *nodulosa.* ×25. D2547. Front view.
2. *Clavulina communis*, var. *nodulosa.* ×25. D2547. Front view.
3. *Clavulina communis*, var. *nodulosa.* ×25. D2547. Front view.
4. *Buliminella convoluta.* Rear view. (After Williamson.)
5. *Buliminella convoluta.* Front view. (After Williamson.)

PLATE 19.

FIG. 1. *Pavonina atlantica.* ×75. Sand Key, Fla.
2. *Bulimina elegans*, var. *exilis.* ×100. D2584. Side view.
3. *Bulimina elegans*, var. *exilis.* ×100. D2584. Apertural view.
4. *Chrysalidina dimorpha.* ×75. D2758.
5. *Verneuilina spinulosa.* Smooth form. ×75. Sand Key, Fla.
6. *Pleurostomella acuminata.* ×75. H79.

PLATE 20.

FIG. 1. *Bulimina pyrula.* ×100. D2111. Side view.
2. *Bulimina pyrula*, var. *spinescens.* ×100. D2212. Front view.
3. *Bulimina pupoides.* ×100. D2160.
4. *Bulimina buchiana.* ×100. D2396. Side view.
5. *Buliminella subcylindrica.* ×100. H80. Front view.
6. *Bulimina affinis.* ×100. D2563.

PLATE 21.

FIG. 1. *Bulimina inflata.* ×100. D2018. Side view.
2. *Bulimina inflata*, var. *mexicana.* ×100. D2377. Front view.
3. *Bulimina ovata.* ×100. D2564. Side view.
4. *Bulimina marginata.* ×100. D2247. Front view.
5. *Bulimina marginata.* ×100. D2247. Side view.

PLATE 22.

FIG. 1. *Bulimina aculeata.* ×100. D2035. Side view of form without spines on the chambers, but with a large, stout, apical spine.
2. *Bulimina aculeata.* ×100. D2035. Side view of a peculiar formed specimen with very broad apertural end.
3. *Buliminella subteres.* ×100. D2144. Apertural view.
4. *Buliminella subteres.* ×100. D2144. Apertural view.
5. *Buliminella subteres.* ×100. D2117. Side view.
6. *Buliminella subteres*, var. ×100. D2761. Apertural view.

PLATE 23.

FIG. 1. *Buliminella spinigera.* ×100. D2677. Apertural view.
2. *Buliminella spinigera.* ×100. D2677. Apertural view.
3. *Buliminella spinigera.* ×100. D2677. Side view.
4. *Buliminella spinigera.* ×100. D2677. Young.
5. *Buliminella elegantissima*, var. *seminuda.* ×150.
6. *Cassidulina bradyi.* ×100. D2555. Side view.
7. *Cassidulina bradyi.* ×100. D2555. Side view, showing aperture.
8. *Virgulina mexicana.* ×75. D2395.

PLATE 24.

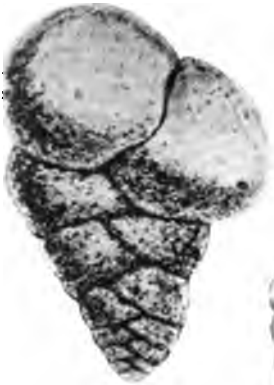
FIG. 1. *Virgulina bradyi.* ×75. D2568. Front view.
2. *Virgulina compressa.* ×75. D2249. Front view.
3. *Virgulina compressa.* ×75. D2249. Rear view.
4. *Cassidulina laevigata.* ×100. D2355. Side view.
5. *Cassidulina mexicana.* ×100. Fowey Rocks, Fla. Side view.
6. *Cassidulina subglobosa.* ×75. D2352. Front view.

PLATE 25.

FIG. 1. *Virgulina(?) advena.* ×75. D2713. Front view.
2. *Virgulina(?) advena.* ×75. D2713. Front view.
3. *Virgulina(?) advena.* ×100. D2713. Broken specimen, showing lip of interior last chamber.
4. *Cassidulina braziliensis.* ×100. D2756. Front view.
5. *Cassidulina braziliensis.* ×100. D2756. Rear view.
6. *Cassidulina laevigata*, var. *carinata.* ×100. Ragged Key, Fla. Side view.
7. *Cassidulina laevigata*, var. *carinata.* ×100. Ragged Key, Fla. Edge view.

PLATE 26.

FIG. 1. *Ehrenbergina trigona*, var. *braziliensis.* ×100. D2756. Dorsal view.
2. *Ehrenbergina trigona*, var. *braziliensis.* ×100. D2756. Ventral view.
3. *Ehrenbergina trigona*, var. *braziliensis.* ×100. D2756. Ventral view, young.
4. *Ehrenbergina trigona.* ×100. D2644. Young.
5. *Ehrenbergina bradyi.* ×100. *Tuscorora* 15.
6. *Virgulina schreibersiana.* ×75. D2614.
7. *Cassidulina crassa.* ×100. D2150. Rear view.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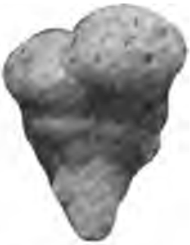
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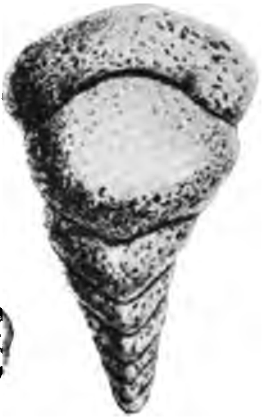
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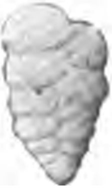
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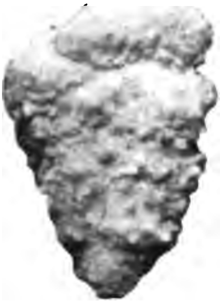
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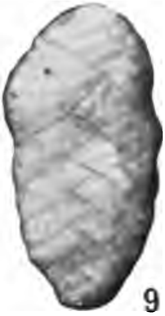
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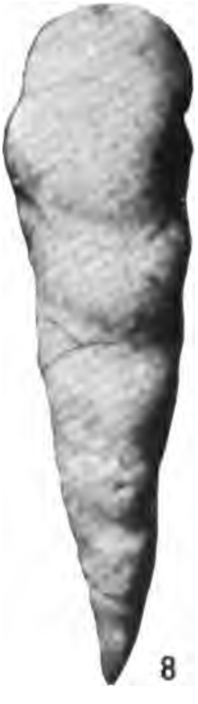
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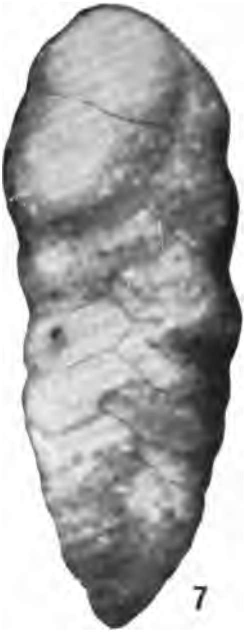
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TEXTULARIIDAE OF THE ATLANTIC OCEAN.

FOR EXPLANATION OF PLATE SEE PAGE 139.

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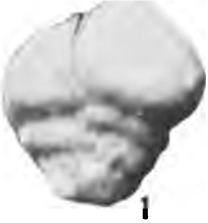
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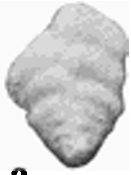
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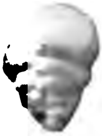
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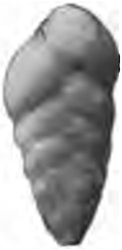
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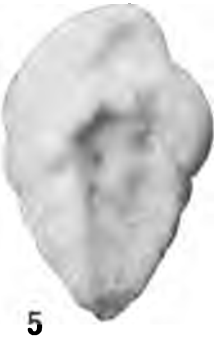
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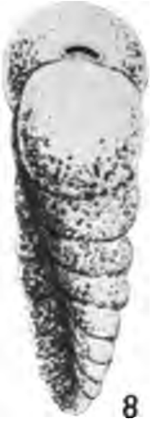
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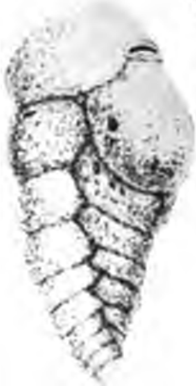
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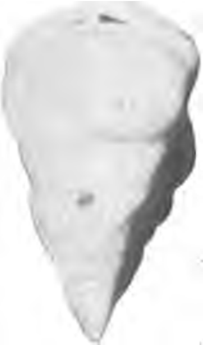
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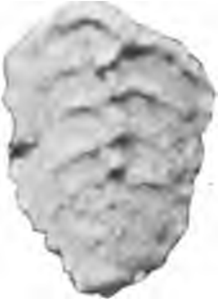
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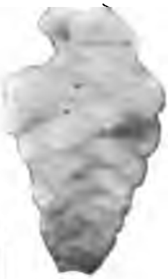
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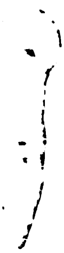
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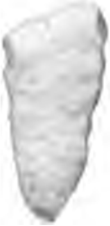
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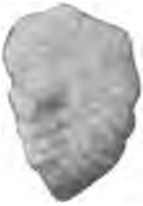
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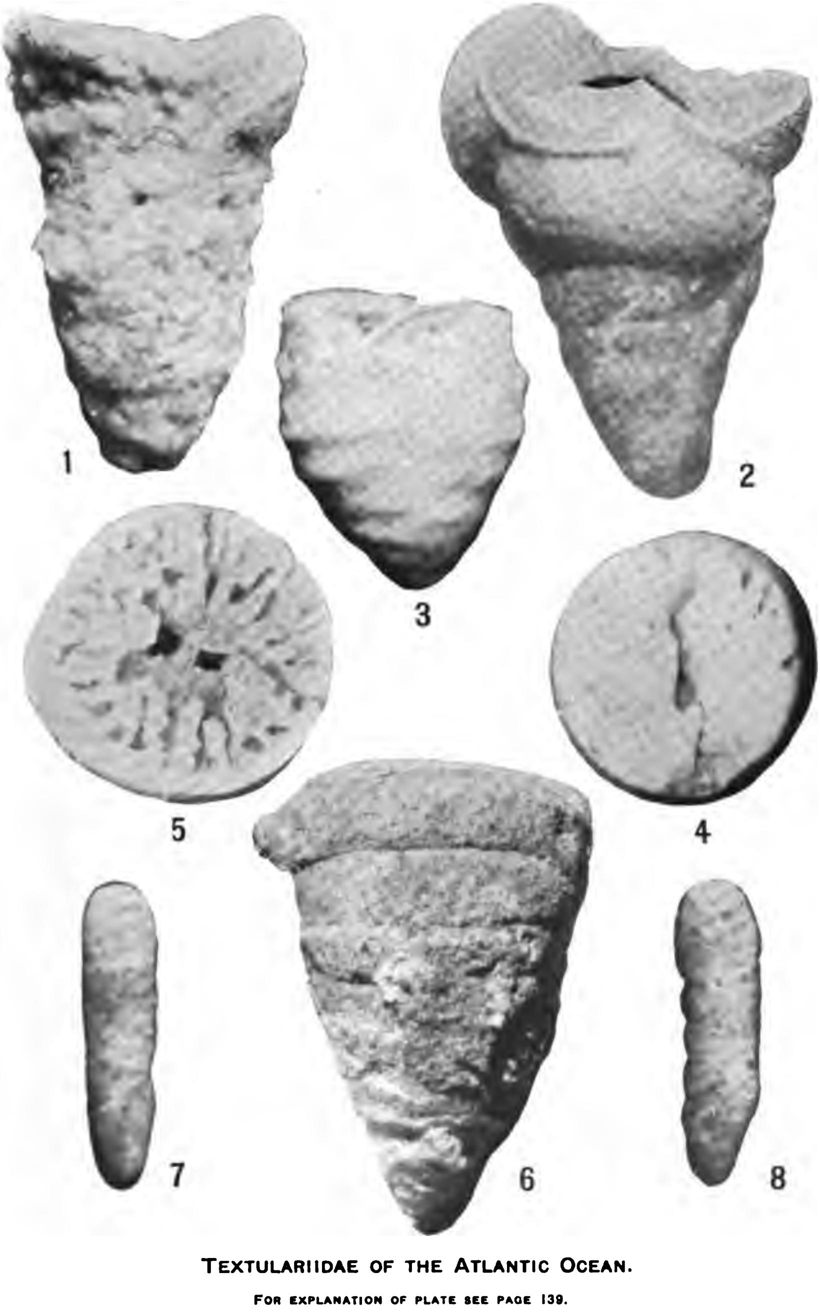
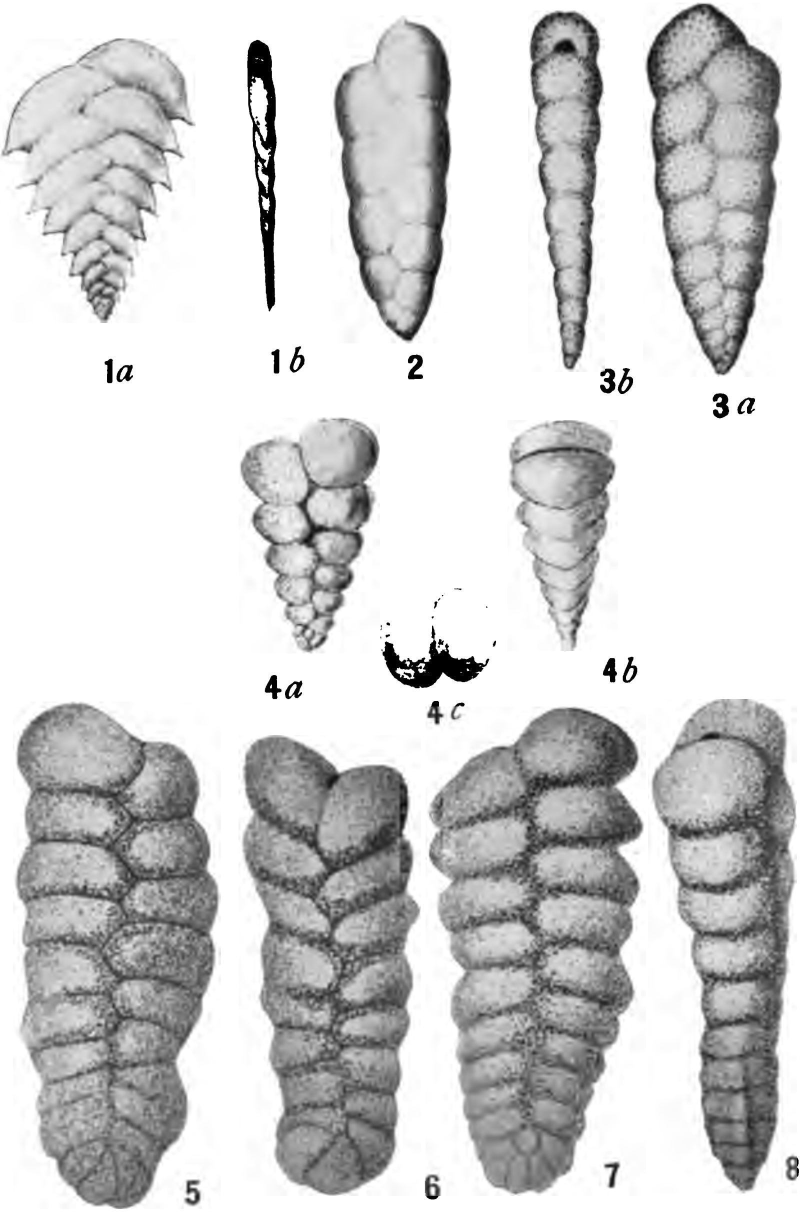
TEXTULARIIDAE OF THE ATLANTIC OCEAN.

FOR EXPLANATION OF PLATE SEE PAGE 139.



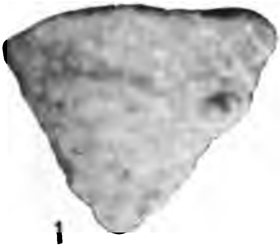
TEXTULARIIDAE OF THE ATLANTIC OCEAN.

FOR EXPLANATION OF PLATE SEE PAGE 139.



TEXTULARIIDAE OF THE ATLANTIC OCEAN.

FOR EXPLANATION OF PLATE SEE PAGE 139.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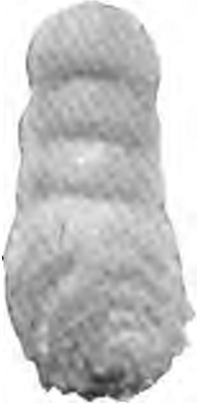
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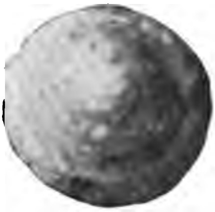
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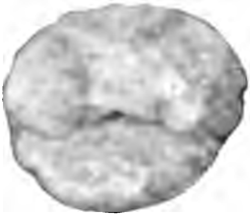
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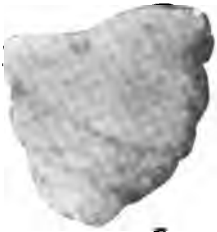
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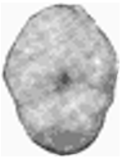
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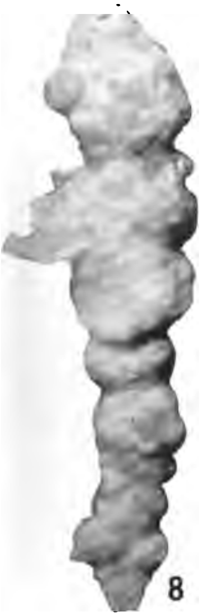
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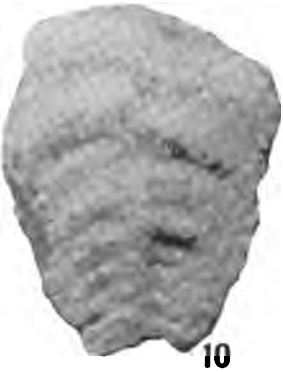
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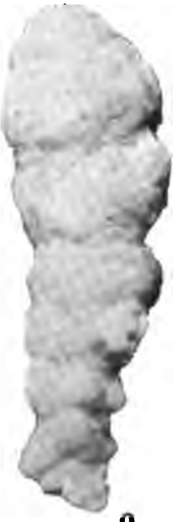
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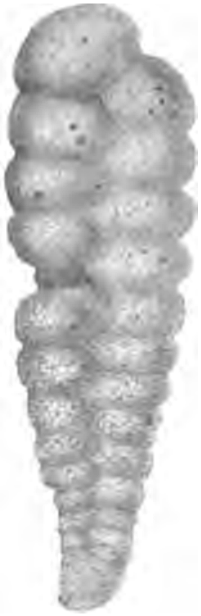
TEXTULARIIDAE OF THE ATLANTIC OCEAN.

FOR EXPLANATION OF PLATE SEE PAGE 140.

UNIV. OF MICH.



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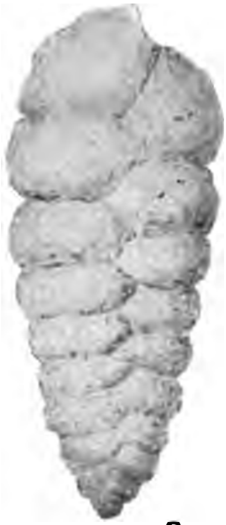

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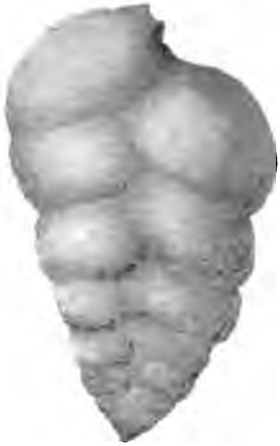

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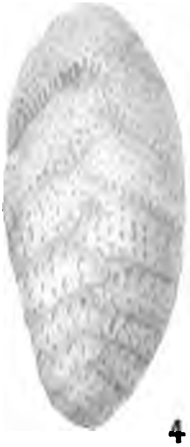

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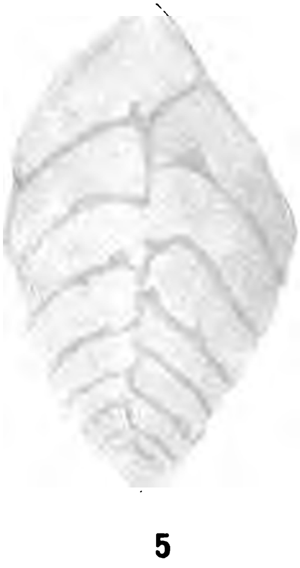

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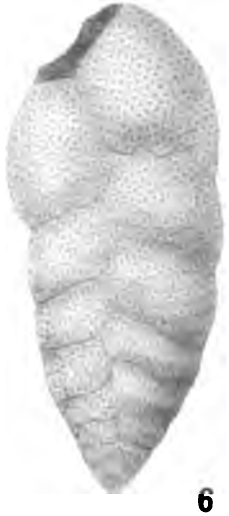

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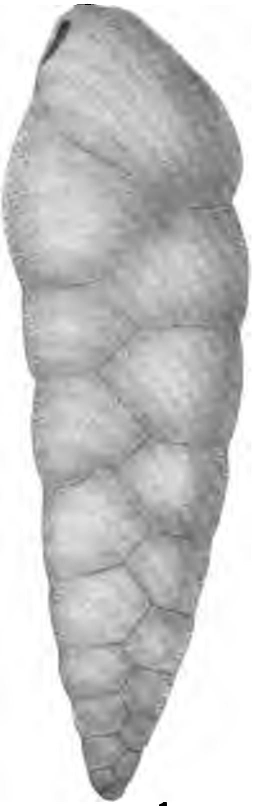
TEXTULARIIDAE OF THE ATLANTIC OCEAN.

FOR EXPLANATION OF PLATE SEE PAGE 140.



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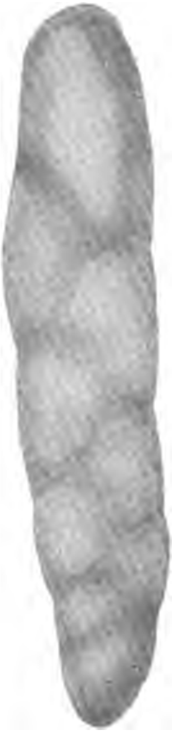

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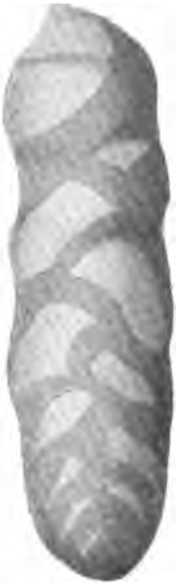

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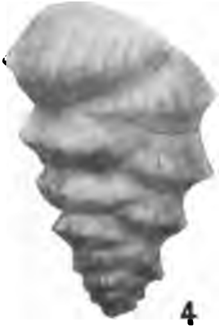

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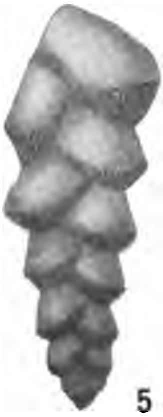

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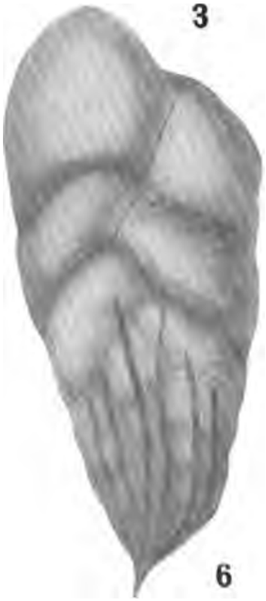

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TEXTULARIIDAE OF THE ATLANTIC OCEAN.

FOR EXPLANATION OF PLATE SEE PAGE 140.

OF MICH.

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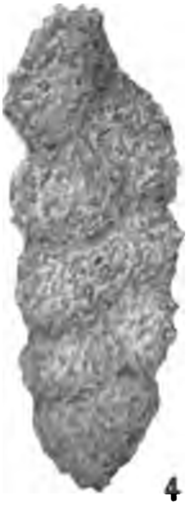

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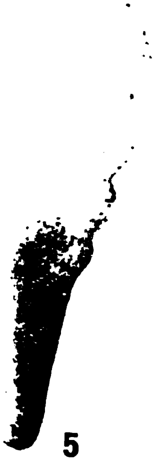

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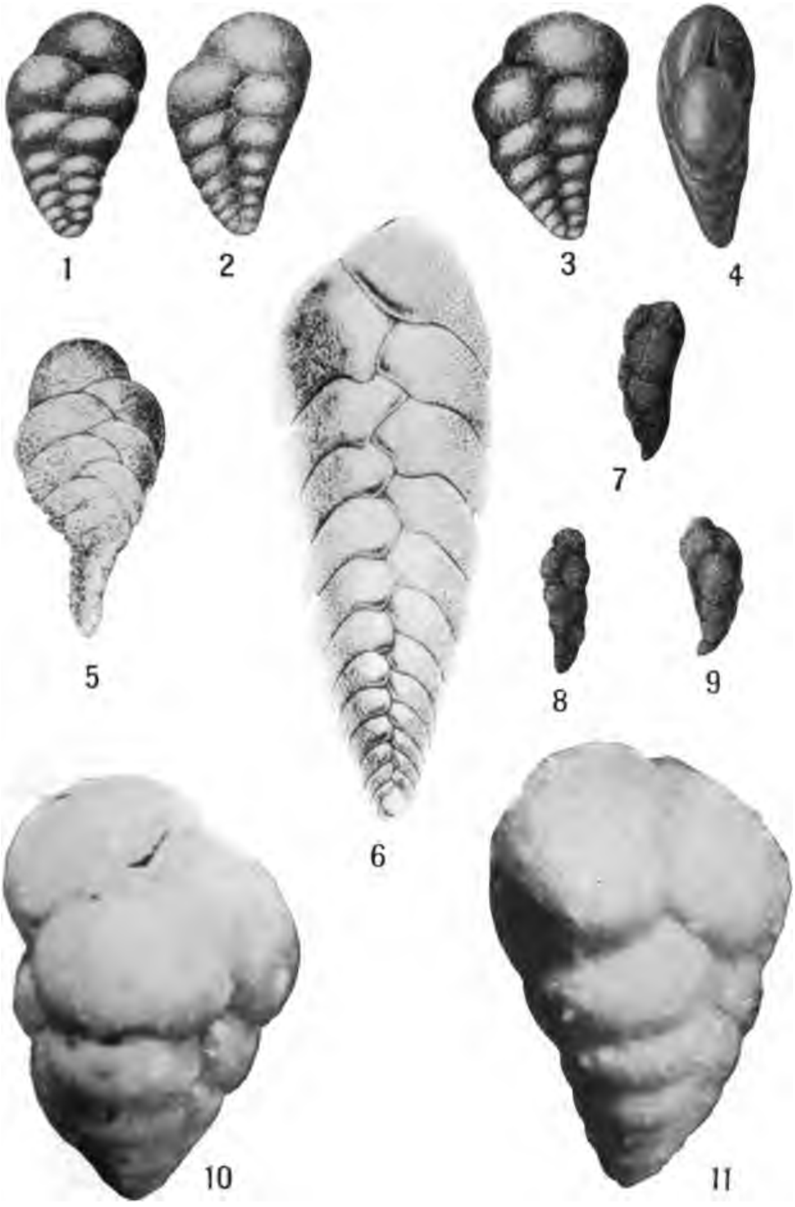
TEXTULARIIDAE OF THE ATLANTIC OCEAN.

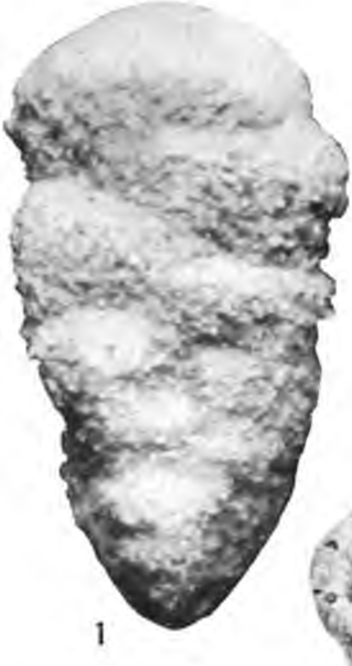
FOR EXPLANATION OF PLATE SEE PAGE 140.



TEXTULARIIDAE OF THE ATLANTIC OCEAN.

FOR EXPLANATION OF PLATE SEE PAGE 140.

UNIV OF MICH



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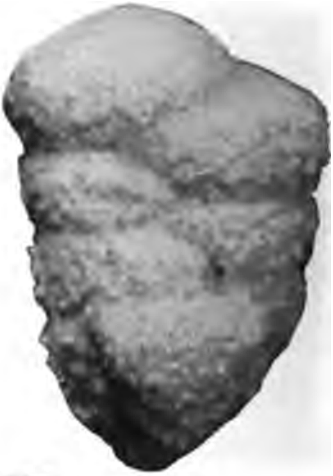

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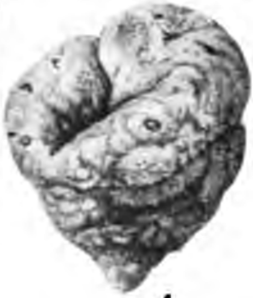

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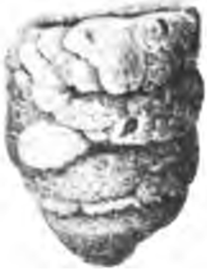

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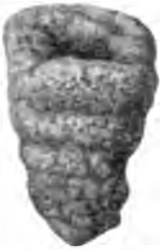

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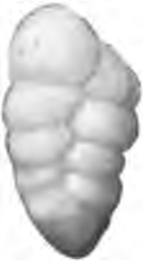

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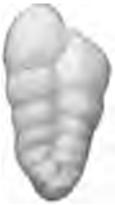

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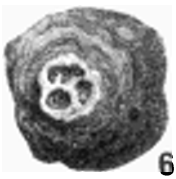

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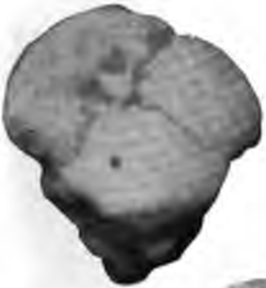
Textulariidae of the Atlantic Ocean.

For explanation of plate see page 141.



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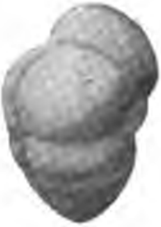

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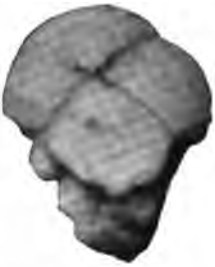

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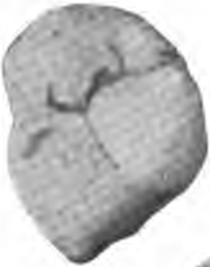

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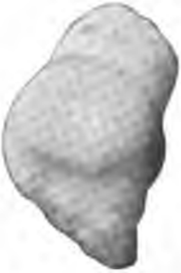

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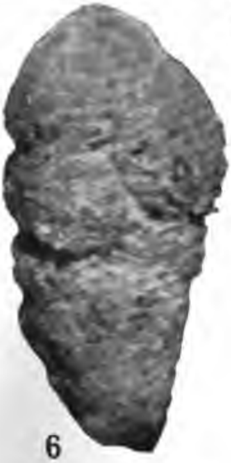

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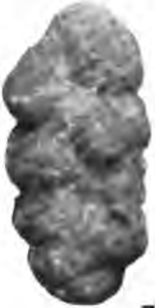

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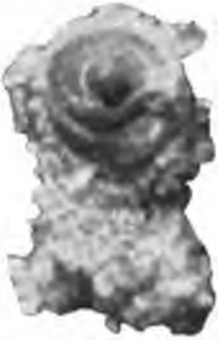

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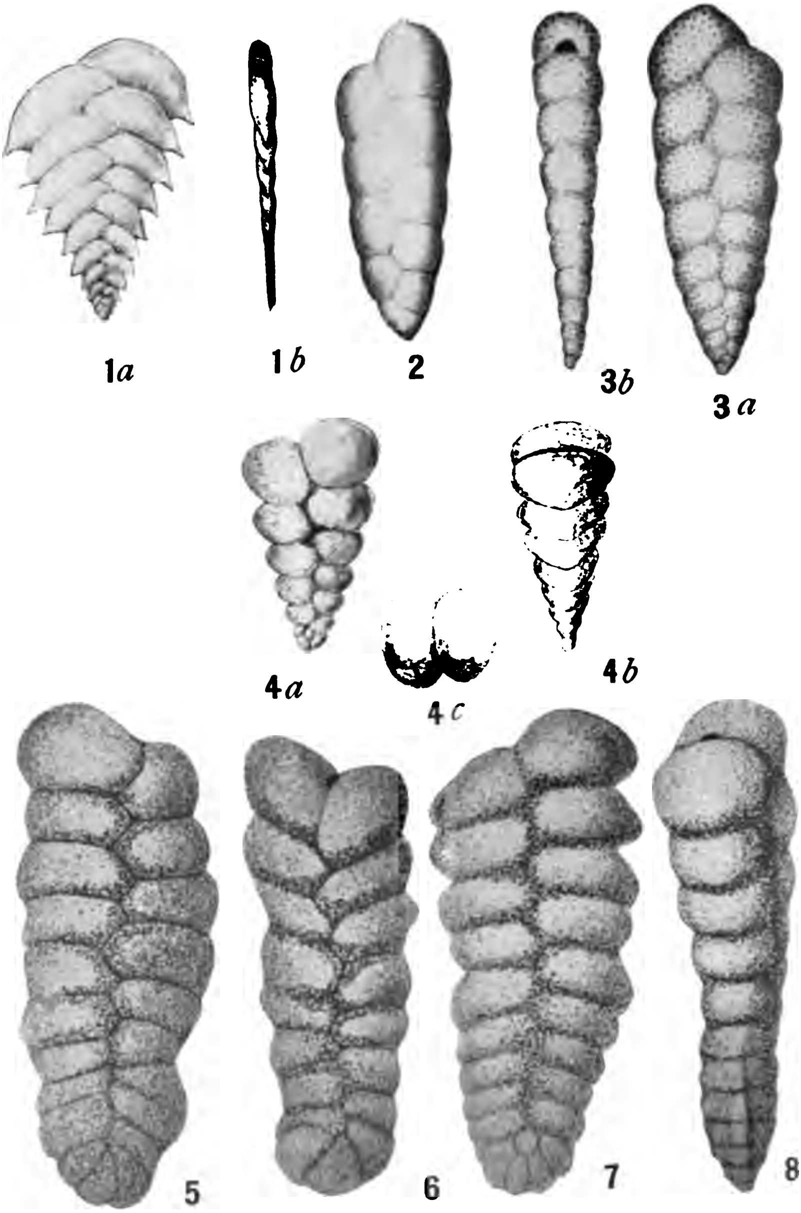
9

TEXTULARIIDAE OF THE ATLANTIC OCEAN.

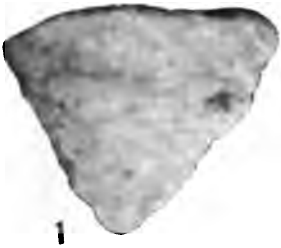
FOR EXPLANATION OF PLATE SEE PAGE 141.

UNIV. OF H.



TEXTULARIIDAE OF THE ATLANTIC OCEAN.

FOR EXPLANATION OF PLATE SEE PAGE 139.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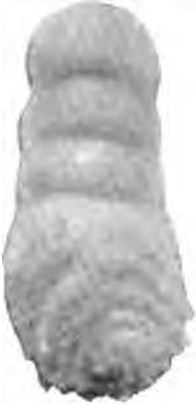
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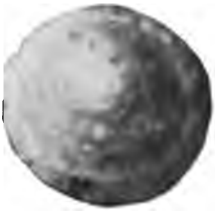
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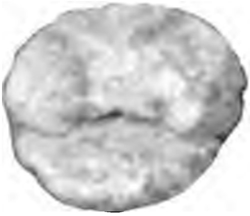
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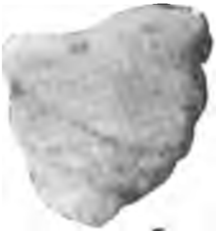
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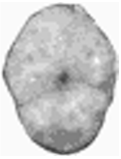
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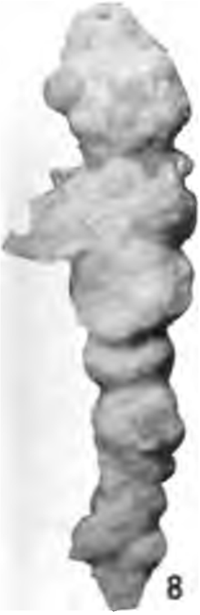
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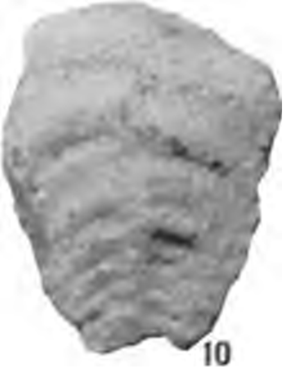
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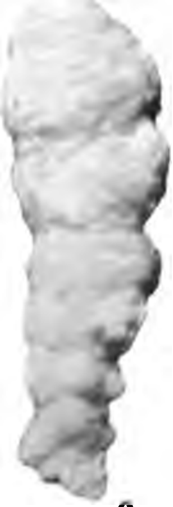
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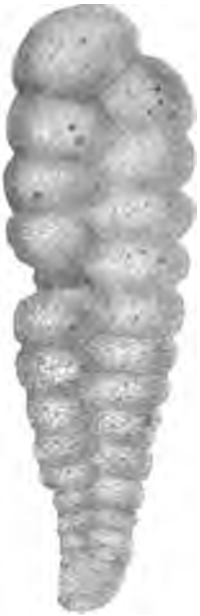
TEXTULARIIDAE OF THE ATLANTIC OCEAN.

For explanation of plate see page 165



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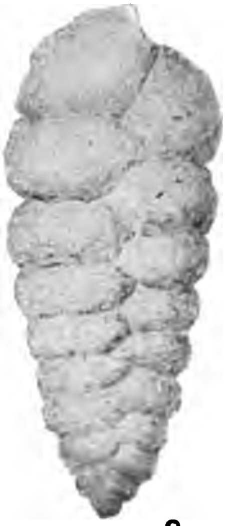

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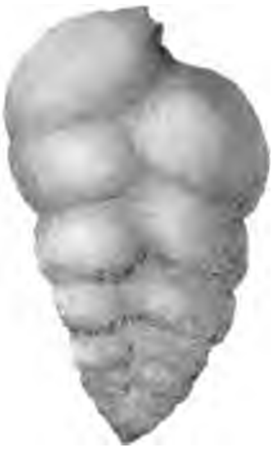

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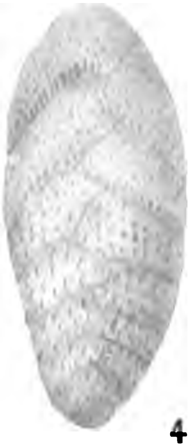

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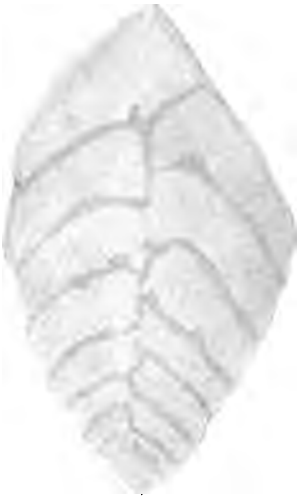

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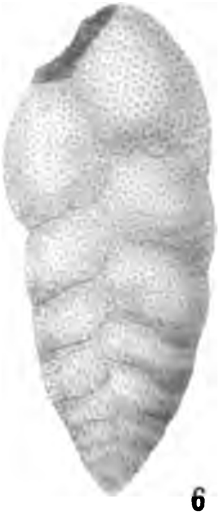

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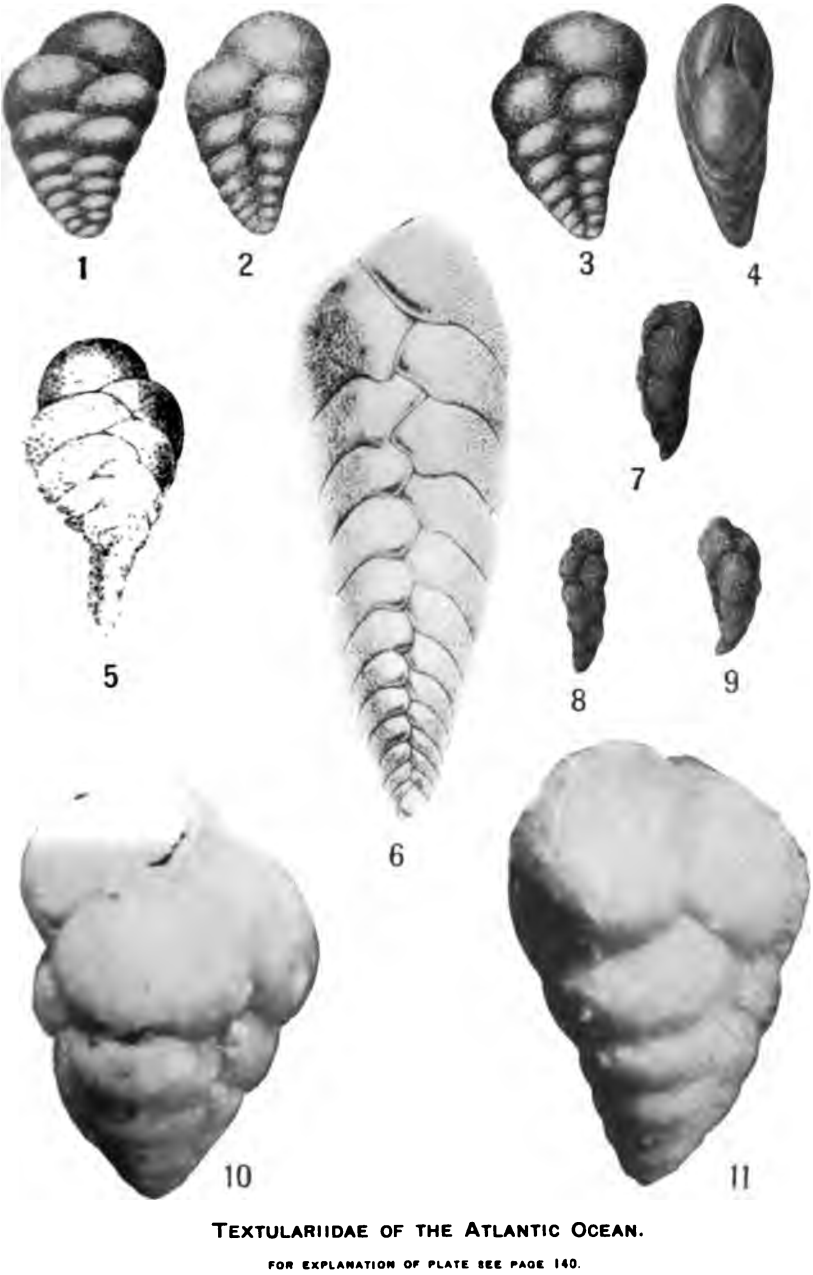
TEXTULARIIDAE OF THE ATLANTIC OCEAN.

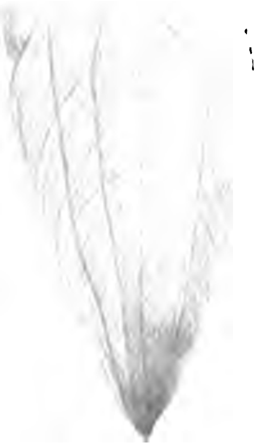
FOR EXPLANATION OF PLATE SEE PAGE 140.



TEXTULARIIDAE OF THE ATLANTIC OCEAN.

FOR EXPLANATION OF PLATE SEE PAGE 140.

UNIV OF MICH



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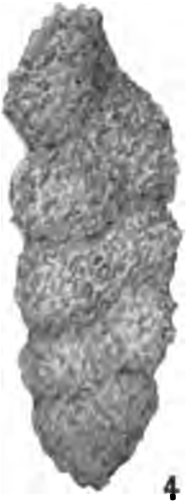

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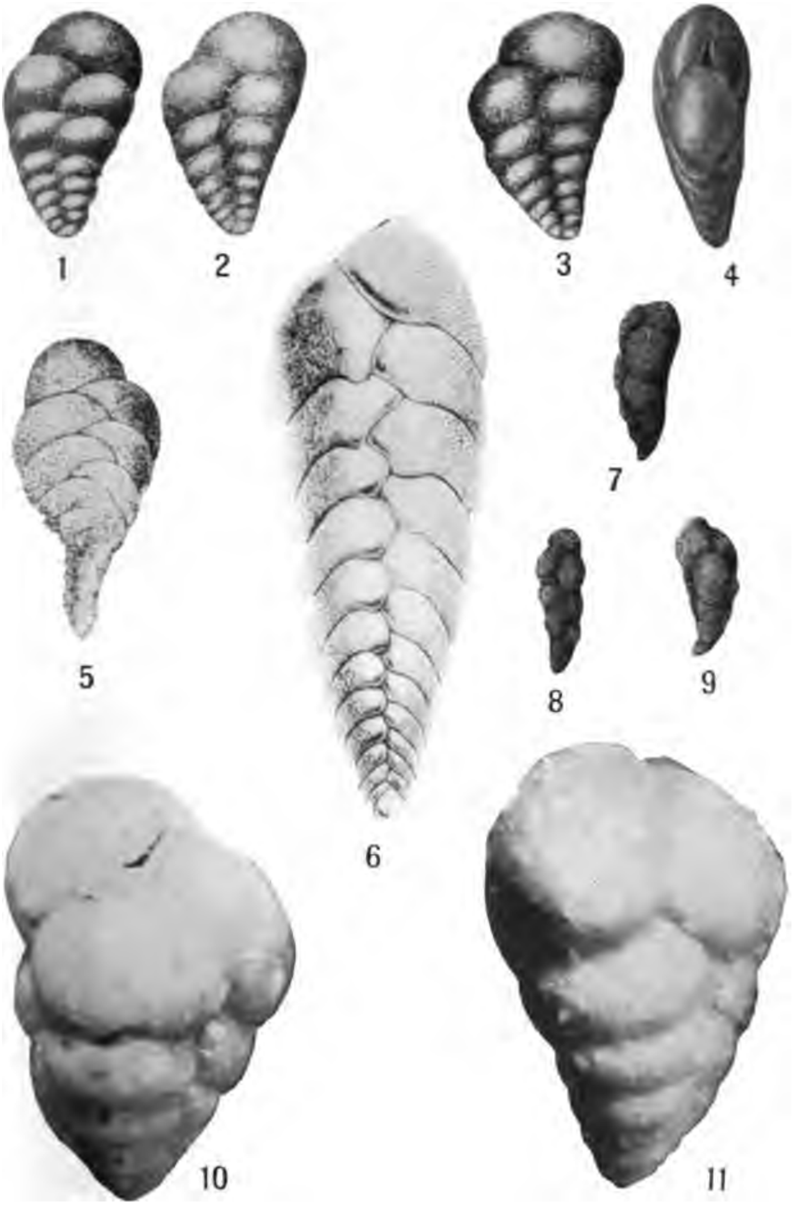
TEXTULARIIDAE OF THE ATLANTIC OCEAN.

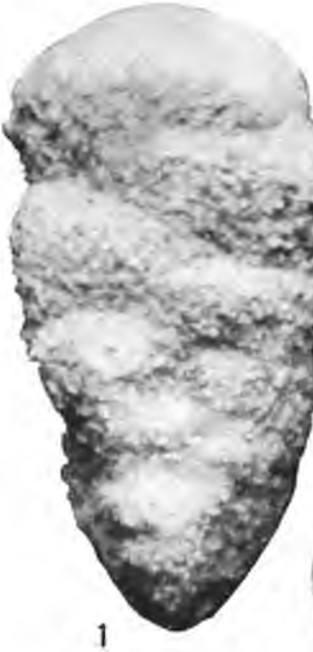
FOR EXPLANATION OF PLATE SEE PAGE 140.



TEXTULARIIDAE OF THE ATLANTIC OCEAN.

FOR EXPLANATION OF PLATE SEE PAGE 140.

UNIV OF MICH



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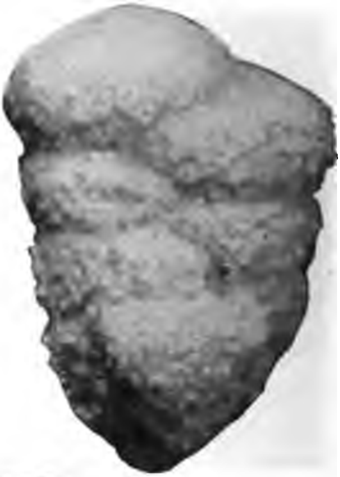

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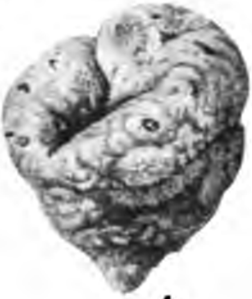

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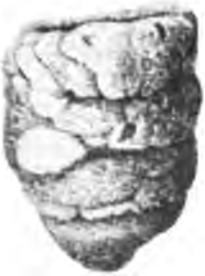

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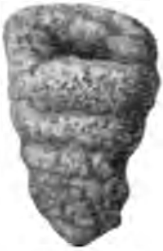

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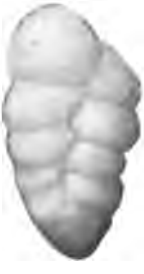

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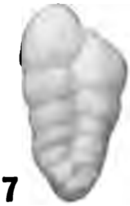

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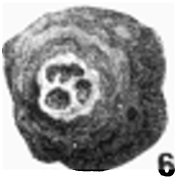

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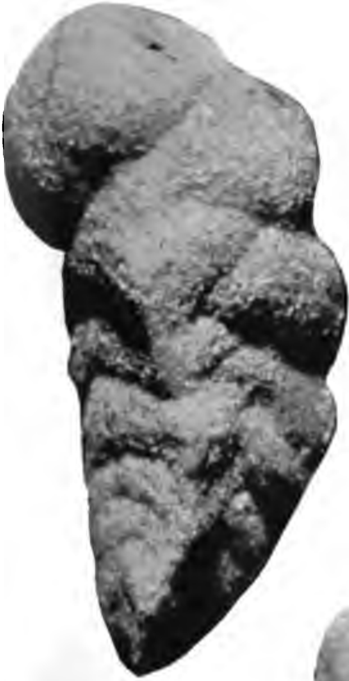

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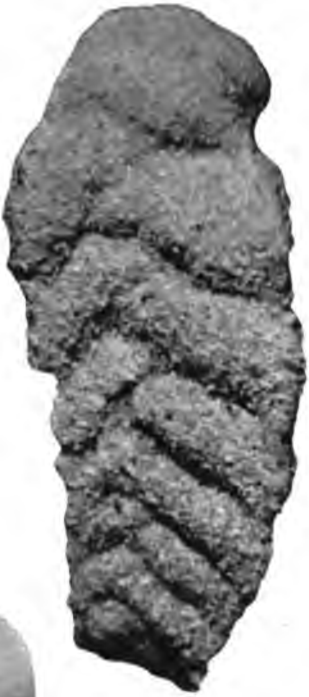

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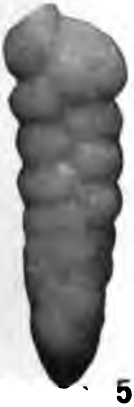

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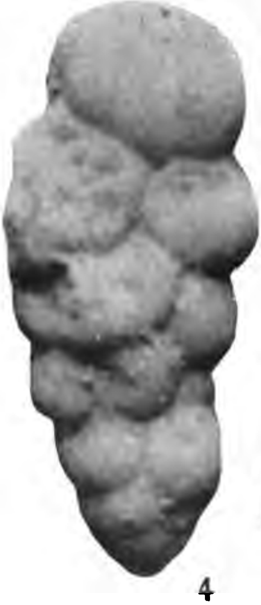

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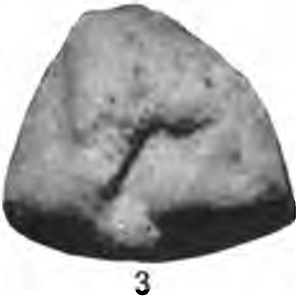

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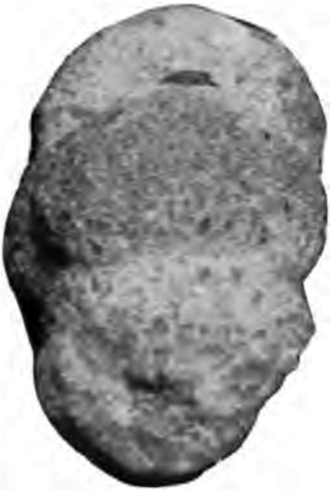

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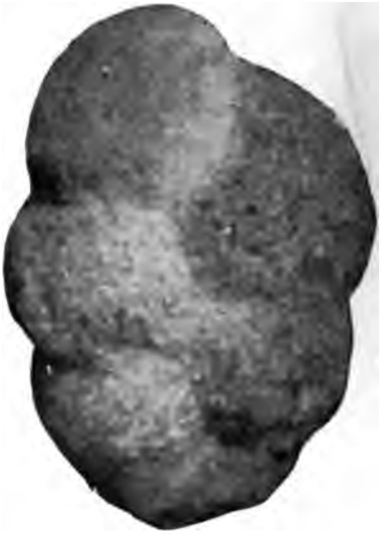

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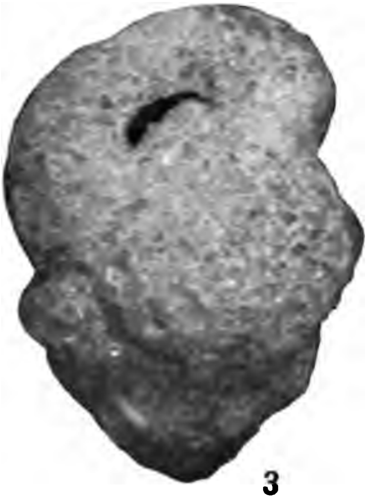

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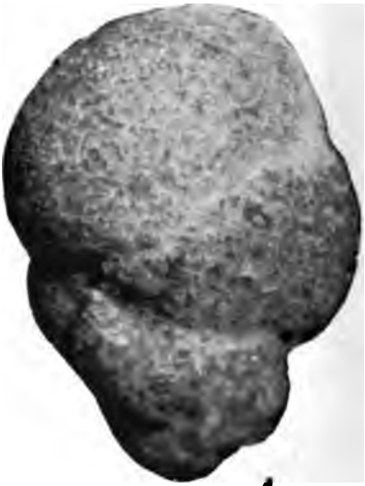

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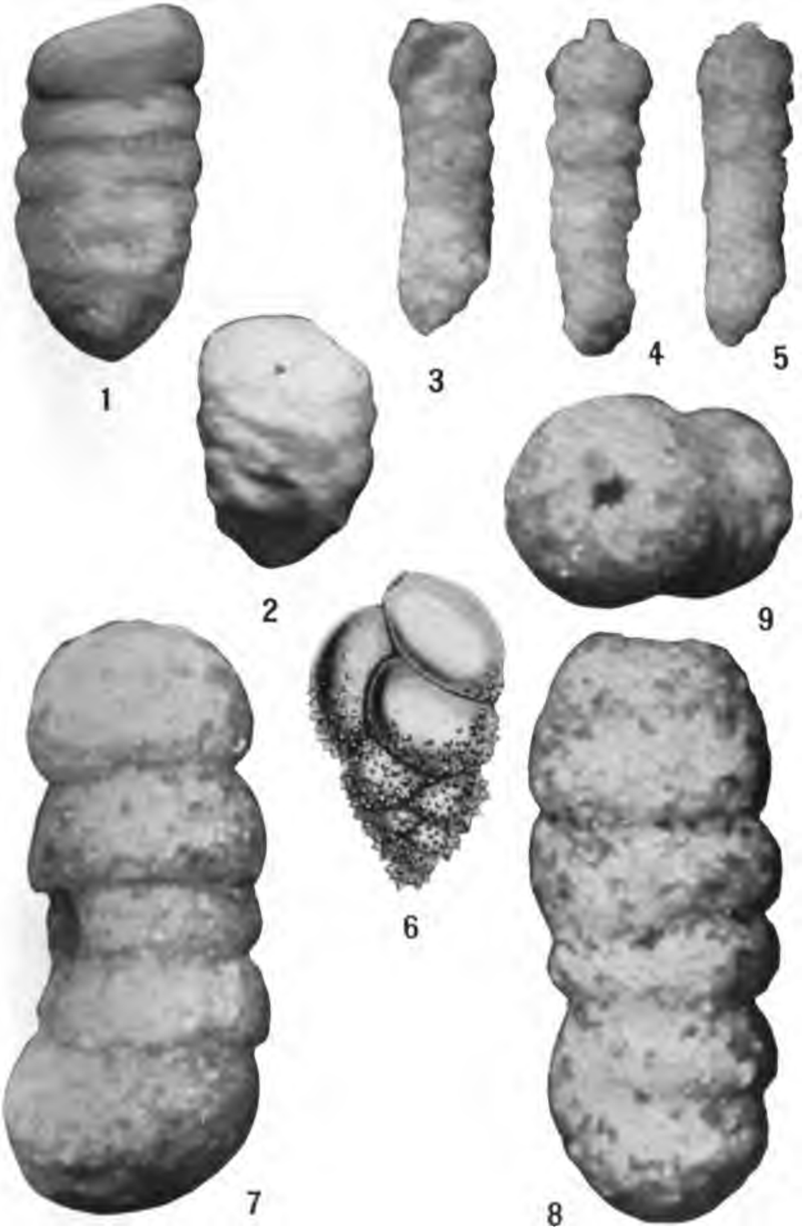

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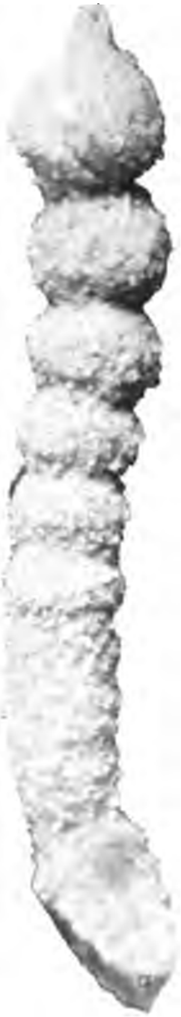

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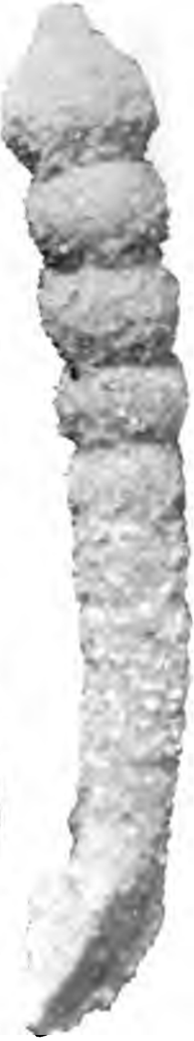

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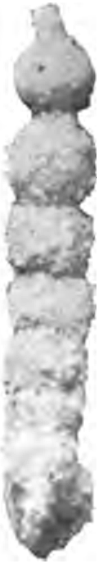

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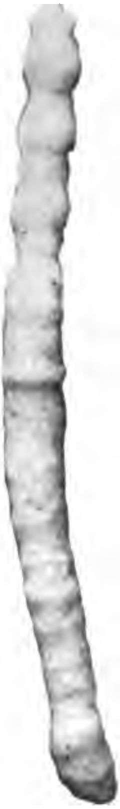

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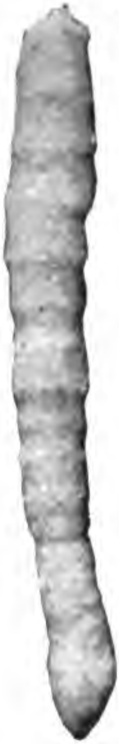

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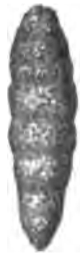

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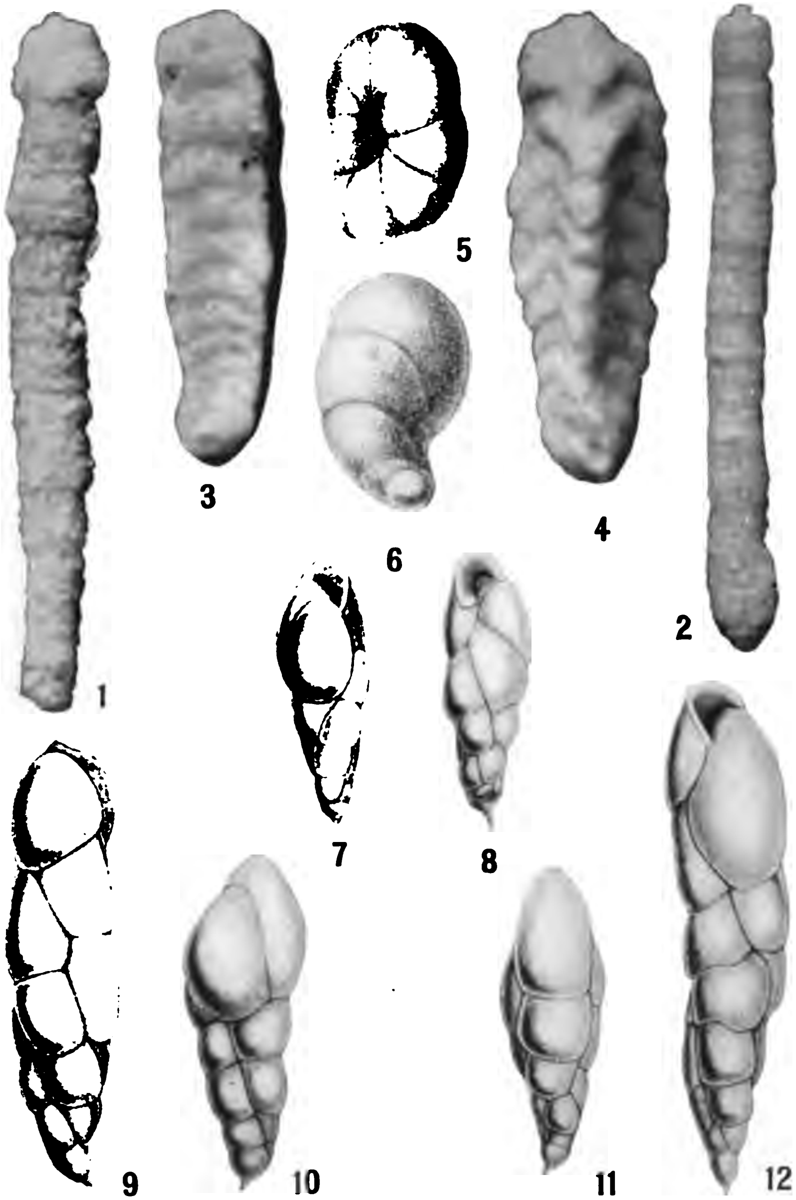

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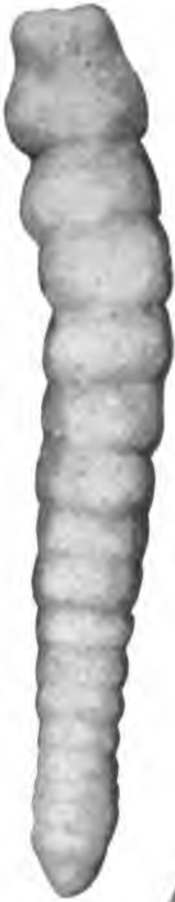
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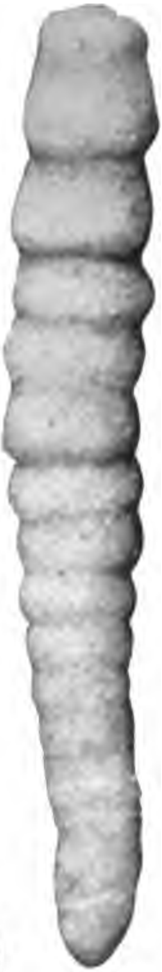
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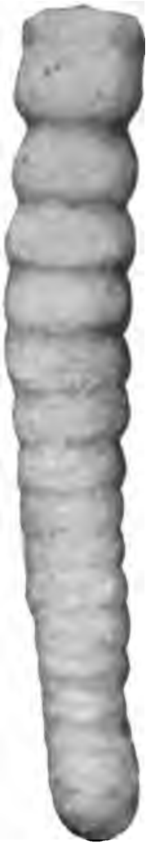
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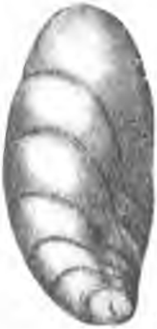
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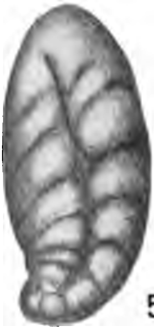
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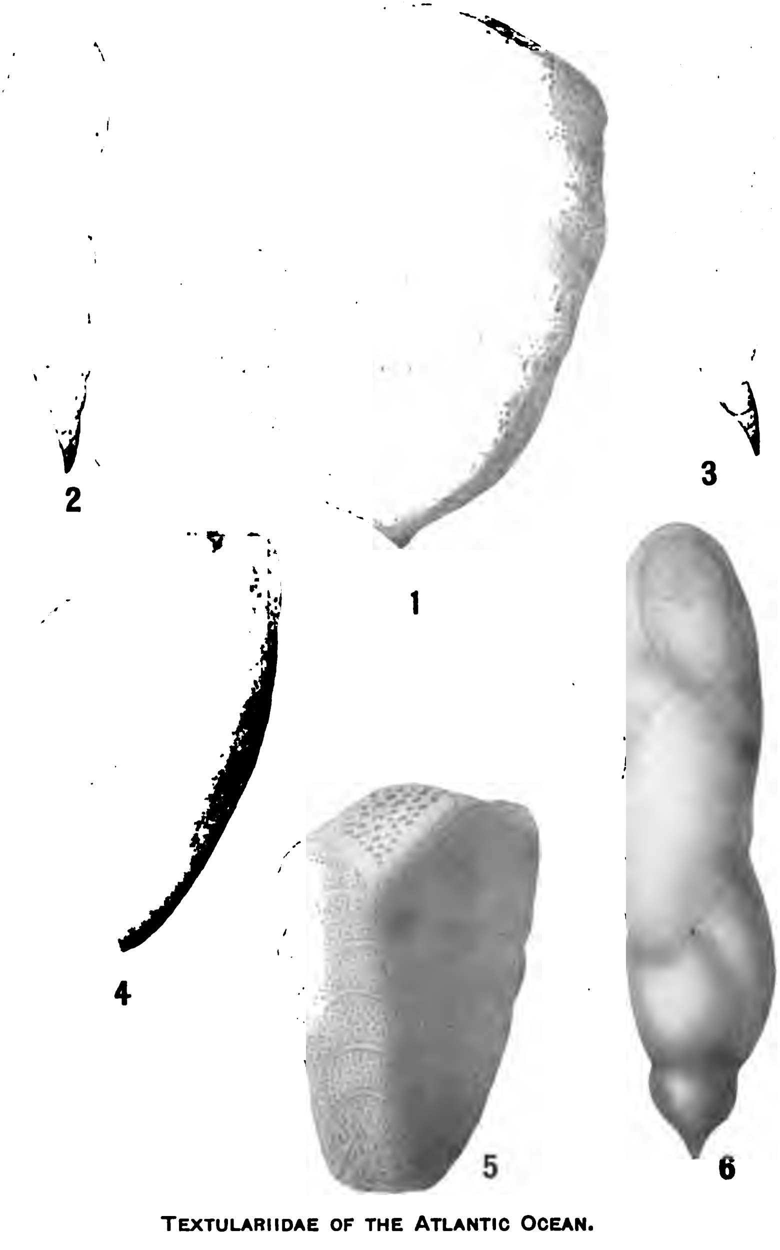

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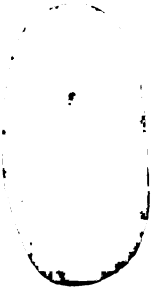
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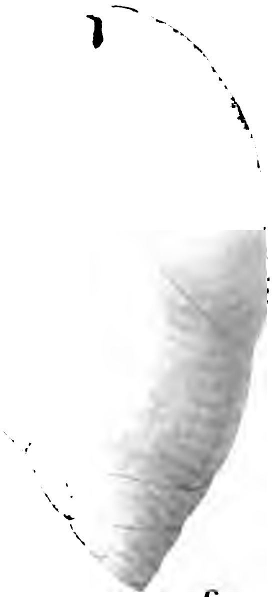
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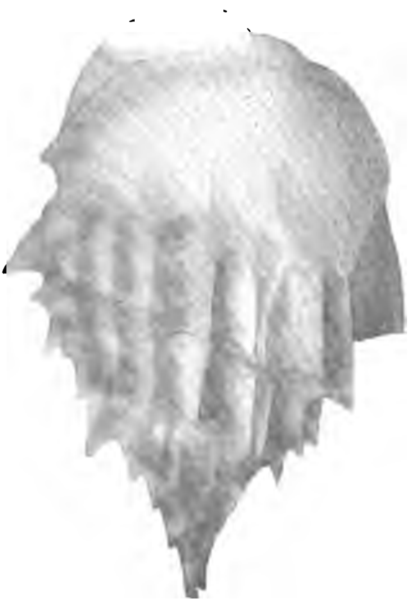

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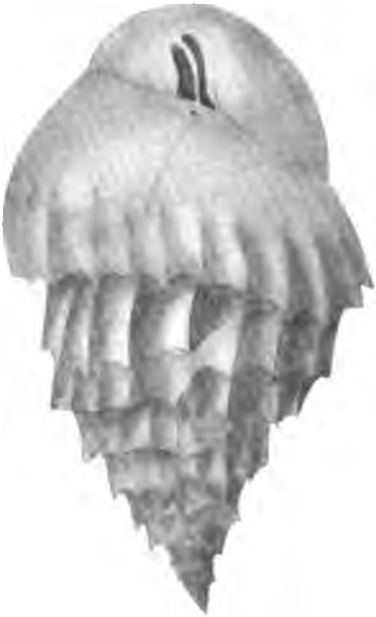

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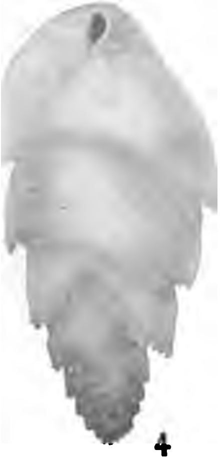

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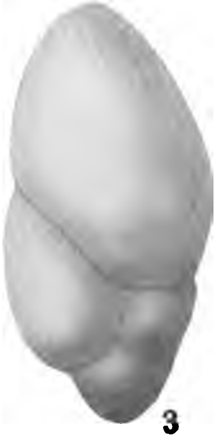

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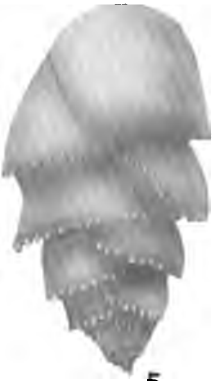

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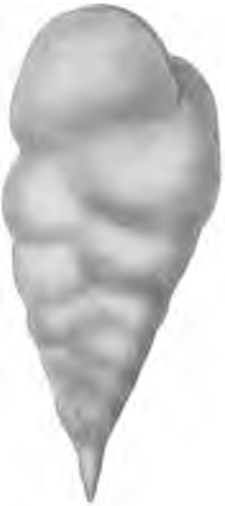

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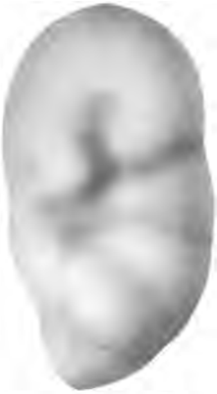

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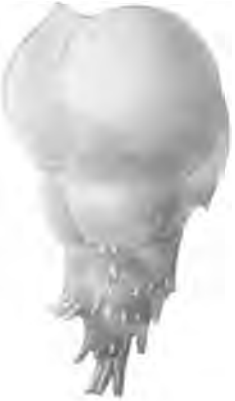

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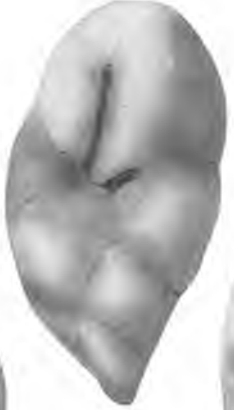

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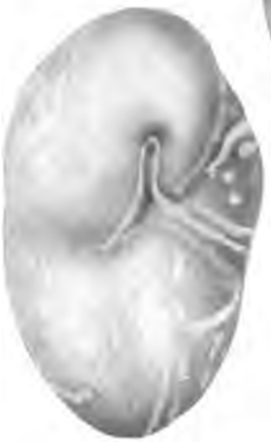

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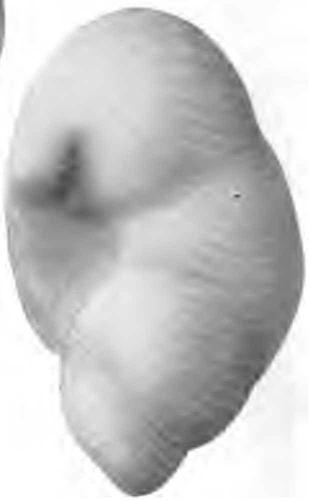

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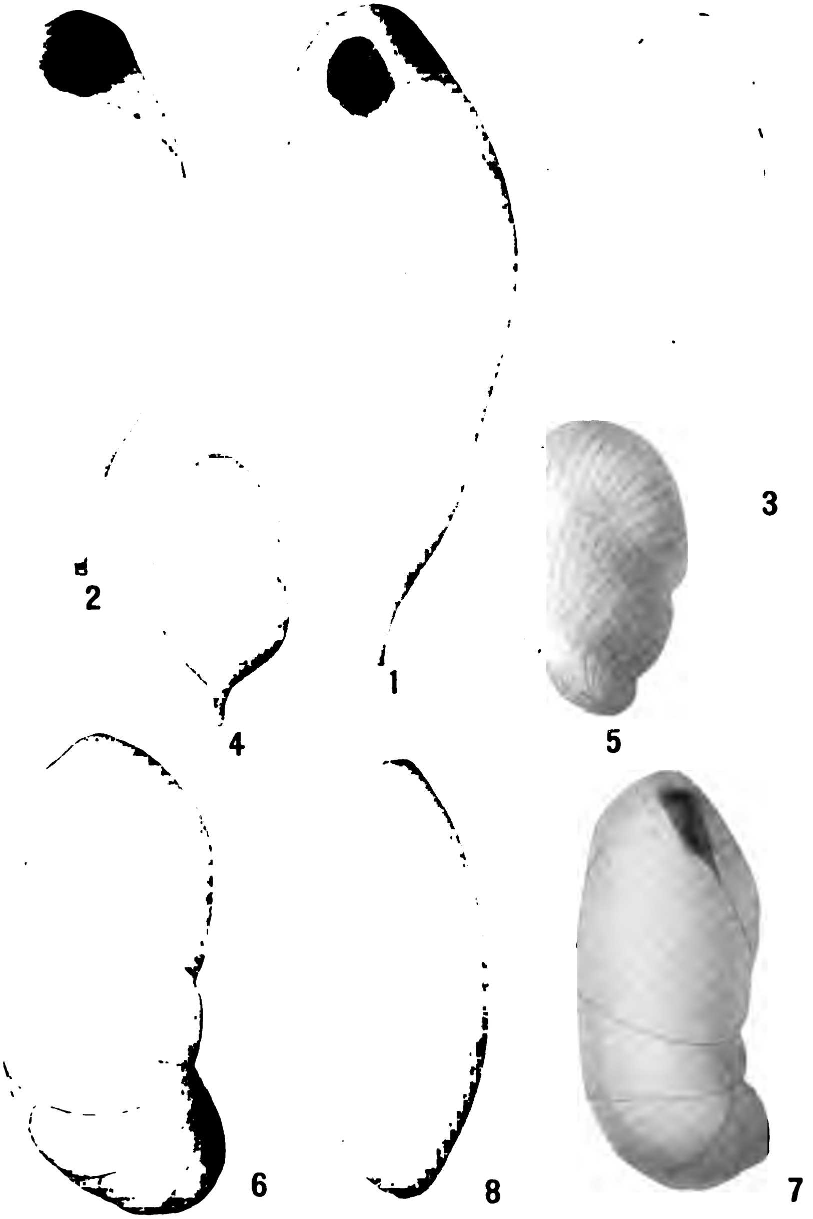

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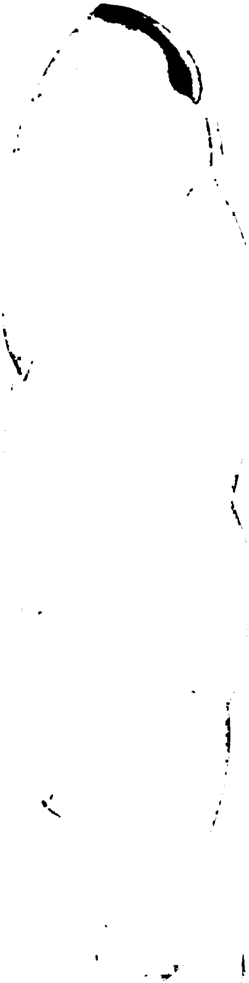
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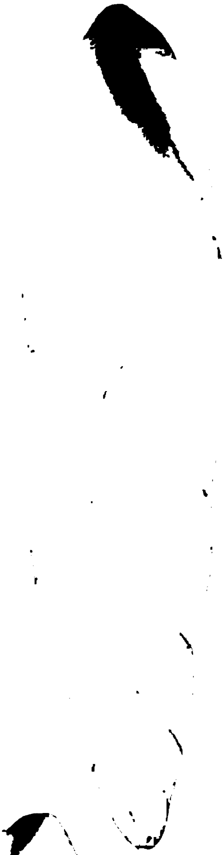
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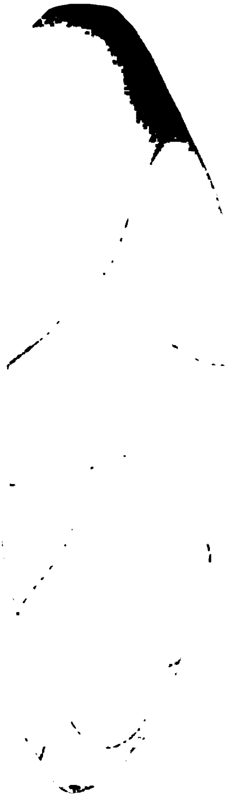
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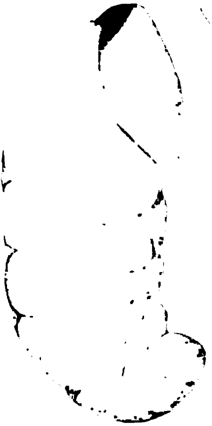
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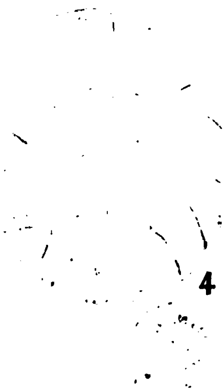
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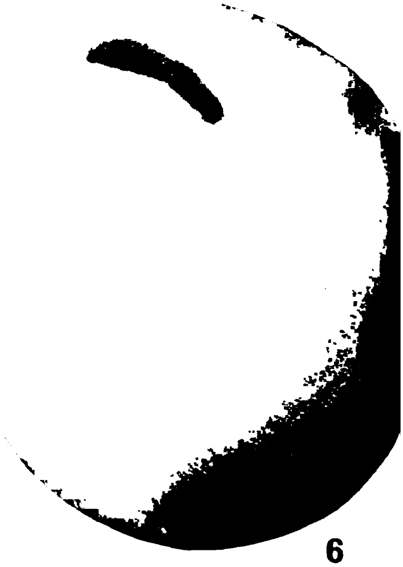
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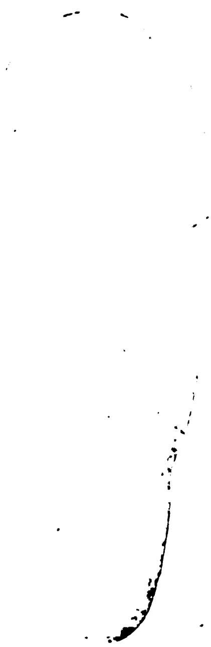

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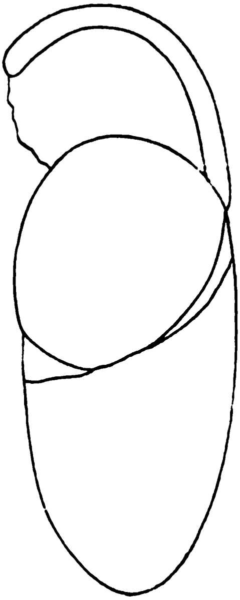

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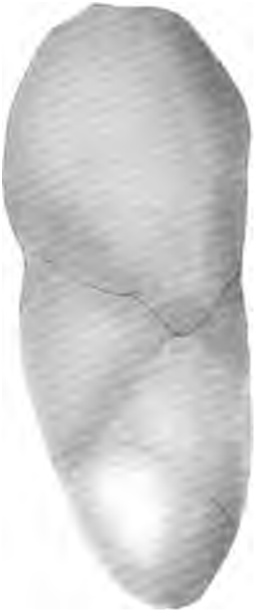

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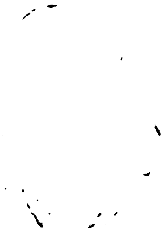

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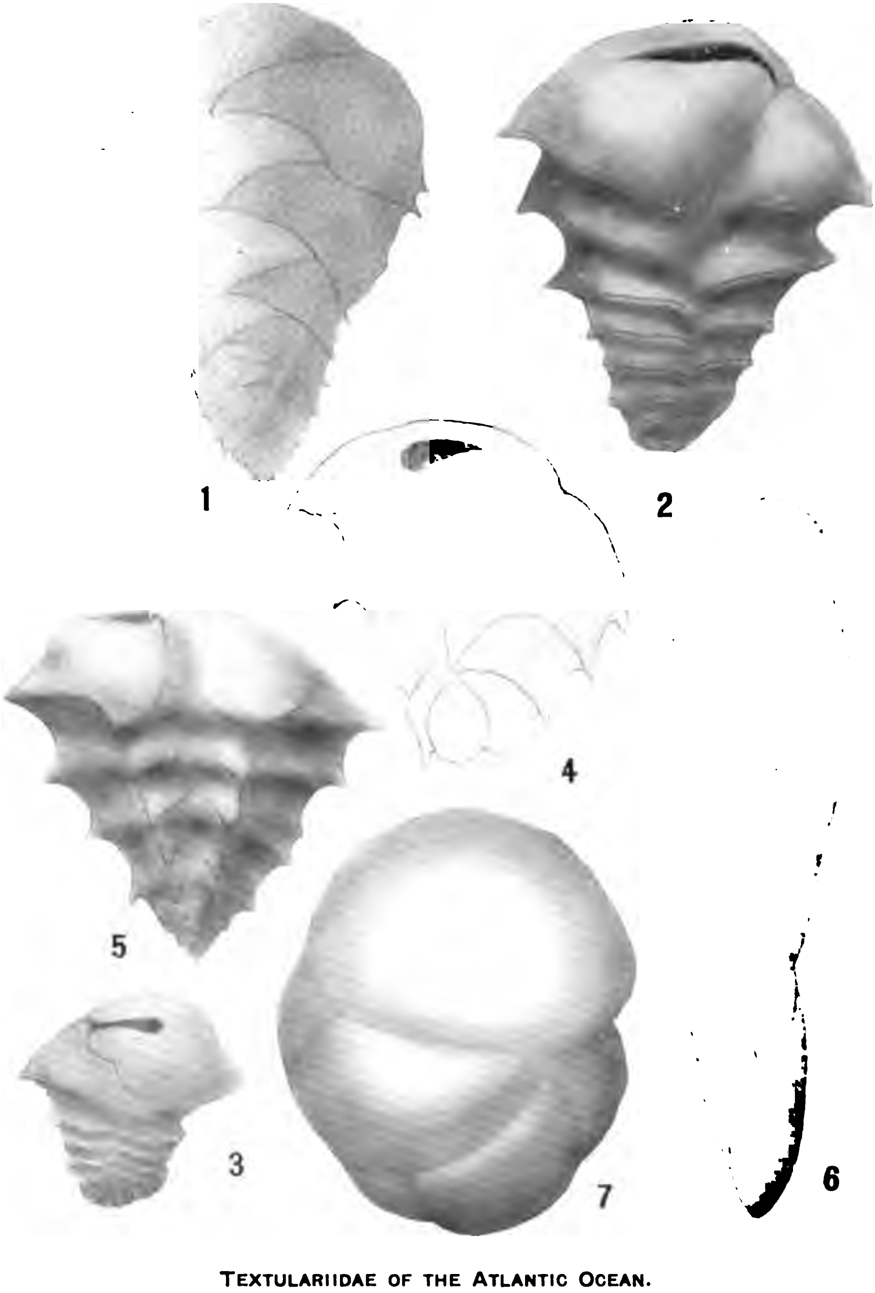

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THE FORAMINIFERA OF THE ATLANTIC OCEAN

PART 4. LAGENIDAE

BY

JOSEPH AUGUSTINE CUSHMAN
Of the Boston Society of Natural History

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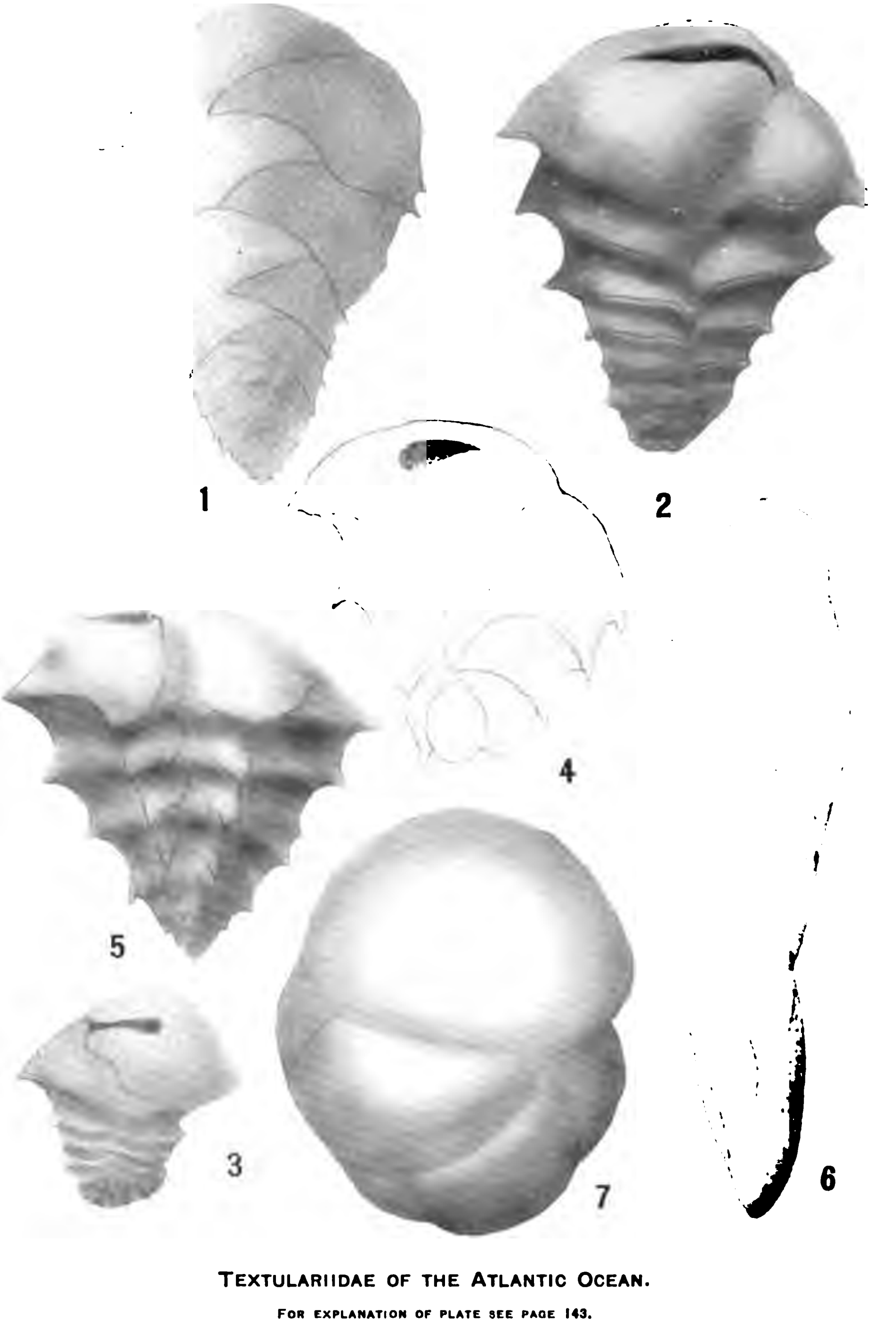

TEXTULARIIDAE OF THE ATLANTIC OCEAN.

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INTRODUCTION.

This paper is the fourth part of a work the intent of which is to describe and illustrate the Foraminifera of the Atlantic Ocean, especially those species which have occurred in the waters adjacent to the shores of the United States, including the whole of the Gulf of Mexico and the Caribbean Sea, that being the area in which most of the work of the vessels of the United States engaged in dredging work has been done. This part includes only the family Lagenidae. The first part, issued in 1918, included the family Astrorhizidae. The second part, issued in 1920, included the family Lituolidae. The third part, issued in 1922, included the family Textulariidae. The fifth part will be devoted to the families Chilostomellidae and Globigerinidae, and further volumes will take up the remaining families of the Foraminifera as they are represented in the Atlantic Ocean.

JOSEPH AUGUSTINE CUSHMAN.

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THE FORAMINIFERA OF THE ATLANTIC OCEAN.

LAGENIDAE.

By Joseph Augustine Cushman,

Of the Boston Society of Natural History.

INTRODUCTION.

This fourth part of the work on the Atlantic Foraminifera deals entirely with the Lagenidae, a family following in natural sequence those families already considered in the three earlier parts. The same general arrangement of data is here adopted.

A study of the distribution, especially of the western Atlantic Lagenidae, and the plotting of their occurrence, has shown that there are very definite faunal occurrences, as has already been noted in the preceding parts, but it is perhaps even more marked in the Lagenidae. There is very little similarity between the species occurring on opposite sides of the Atlantic, even in the temperate regions. The fauna developed off the coast of New England in cold water seems to be most closly allied with that of Baffin Bay and Spitzbergen, while of those species found in the warmer waters off the southern coast of New England, practically none are found in typical form on the coast of Europe. Those species which are characteristic of the Gulf of Mexico and the Caribbean range northward to the coast of Georgia or South Carolina, and in deeper water to Bermuda, but as a rule do not occur along our Atlantic coast north of Cape Hatteras. As indicated with the preceding families, the relationship of the Caribbean and Gulf of Mexico fauna is with that of the Indo-Pacific.

I have tried to give a reference to the various species found on the eastern side of the Atlantic, but have made the reference brief as a forthcoming work of Heron-Allen and Earland on the British Foraminifera will no doubt give greater detailed data in regard to such species.

SYSTEMATIC PART.

A systematic presentation of the various groups of the family follows:

Family 5. LAGENIDAE.

Test calcareous, vitreous, finely perforate, either monothalamous or made up of a series of chambers arranged in a straight or curved axis, or close-coiled or spirally, or even in an alternating manner; aperture either radiate or simple or with a neck and phialine lip.

The Lagenidae form one of the most distinctive groups of the Foraminifera and its members are readily recognized. Usually the genus *Lagena*, making up the subfamily Lageninae, has been taken as the radicle from which the other genera have been derived. Species like *L. globosa* probably come as near a primitive radicle for this family as it is possible to determine.

From *Lagena* there is a question as to which should be considered the more primitive, *Nodosaria* or *Cristellaria.* As numerous species assigned to *Nodosaria* have in the microspheric form definite indications of being derived from coiled ancestry, it would seem as though the coiled form, such as *Cristellaria*, may be the more primitive. The genera *Marginulina*, *Vaginulina*, and *Frondicularia* are all evidently derived from coiled forms such as *Cristellaria. Lingulina* also may have in its microspheric form a coiled series in its young. This would therefore leave *Nodosaria* practically alone as the only genus without definite coiling, but as we have already noted that certain Nodosarias in their microspheric form show an arcuate test and oblique sutures, it would seem to indicate that the entire group is derived through originally coiled forms.

A study of the apertures throughout the families shows an interesting result. A few genera, such as *Trifarina*, *Uvigerina*, and *Siphogenerina*, have typically a test with an elongate neck and phialine lip. Such a type of aperture occurs in some of the species of *Nodosaria*, and occasionally elsewhere. On the other hand, most of the species of *Cristellaria*, *Vaginulina*, *Marginulina*, *Frondicularia*, and *Polymorphina*, with some of the species of *Nodosaria*, have an aperture without an elongate neck and a radiate form as the characteristic apertural distinction. Certain species of *Polymorphina* in their senescent characters show the aperture with a neck and lip, and this distinction of the apertural characters may not be of great significance. In the subfamily, Polymorphininae, instead of either a straight or linear series, a spiral arrangement is characteristic. In the subfamily Uvigerininae a spiral arrangement is again a typical character.

The Lagenidae, as a whole, are richly ornamented, and although the ornamentation may be definitely grouped into costae, spines, and winglike plates, there are nevertheless combinations of these in which the costae become broken into knobs, bosses, and spines, and the plates variously broken into tooth-like projections, and various combinations of the different types of ornamentation may occur in the same species.

In addition, the delicacy of forms and curves that appear throughout the group, together with their glassy tests, makes this family by far the most attractive of the various groups of Foraminifera.

Taking the oceans as a whole, the Lagenidae are best developed in tropical regions at depths of 100–500 fathoms (183–914 meters), where they often reach extraordinary numbers, both in species and individuals. In colder waters the number of species is usually not so large, but *Cristellaria*, *Nodosaria*, etc., reach a large size at similar depths, and often in deeper water. In certain temperate regions, such as that of the British Isles, *Lagena* especially reaches great development in shallow water. In other regions *Lagena* seems to be found in greatest numbers from 1,000–2,000 fathoms (1829–3658 meters), indicating that temperature is probably a large factor in their distribution.

Subfamily 1. LAGENINAE.

Test consisting of a single chamber, the aperture either ecto- or entosolenian.

This subfamily includes the single genus *Lagena*.

Genus LAGENA Walker and Boys, 1784.

Lagena WALKER and BOYS (type, *L. globosa* (Montagu)), Test. Min., 1784, p. 3.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 440.—CHAPMAN, The Foraminifera, 1902, p. 187.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 3.

Description.—Test monothalamous, smooth or ornamented, generally flask-shaped; aperture ecto- or entosolenian.

The genus *Lagena* may be taken as the radicle from which the various genera of the Lagenidae have been derived. It is single-chambered, except for certain specimens which are united accidentally, either by mechanical means or by unusual divisions of the test in growth. The genus contains a great many species and varieties, the relationships of which, as any examination of the literature will show, are in a very chaotic condition. The opinion as to the limits of variation of the various species varies greatly with different authors. I have been struck with the comparative lack of variability in the species observed in the examination of the *Albatross* collections from the western Atlantic. Apparently the *Lagenae* are not nearly as abundant in the western Atlantic as they are off the coast of the British Isles, and in various parts of the Pacific, but where they do occur they are often in considerable numbers. In such cases the variability has been found to be slight. I have had considerable amounts of European material, especially from off the southwest coast of Ireland, and while there is a certain amount of variation shown, the majority of specimens in most cases seem to be fairly constant in their characters. Most of the species, which from the literature are very widely distributed, are either smooth species where there are very few characters available, or where the costate or striate character has been taken as a distinctive mark without reference to the general shape of the test or other characters which might have been used as distinctions. I believe with a study of sufficient specimens it will be possible to limit the shallow-water species as definitely as any other groups. As elsewhere, the deep-water species seem to be widely distributed.

The apertural characters have been used to distinguish different groups in *Lagena*. Such names as *Entosolenia*, *Fissurina*, *Phialina*, etc., have been used in a subgeneric sense, but until more is known of the amount of true variation it does not seem best to use them. Such species as *L. elongata* have been spoken of as "open at both ends." I have been able to examine a large number of specimens of the elongate forms, and while many of them have both ends open it has seemed in every case to be due to imperfect preservation of the specimens. In every such lot there are, when sufficiently well preserved, a few specimens which show the delicate phialine lip, and the opposite end, while extended out into a very attenuate test, is closed. Therefore I think that except for abnormal specimens the completely preserved specimens will show that one end of the test is always closed.

In order to facilitate the use of this work as a reference guide, the various species of *Lagena* are arranged alphabetically. The figures as nearly as possible are arranged in the same order.

As Heron-Allen and Earland are now working on a very complete description of the foraminifera of the general region of the British Isles, I have simply indicated the occurrence of certain British species, as their work will undoubtedly make the data very complete for this part of the Atlantic from which I have comparatively little material.

In its geological history the genus *Lagena* has been recorded as far back as the Cambrian, but whether the specimens are true *Lagena* may be somewhat of a question.

LAGENA ACUTA (Reuss).

Fissurina acuta Reuss, Sitz. Akad. Wiss. Wien, vol. 46, pt. 1, 1862 (1863), p. 340, pl. 7, figs. 90, 91.

Lagena acuta Fornasini, Boll. Soc. Geol. Ital., vol. 7, 1888, p. 47, pl. 3, fig. 6.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 6, pl. 38, fig. 6.—Heron-Allen and Earland, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 82; Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 249; Journ. Roy. Micr. Soc., 1916, p. 45.

Heron-Allen and Earland in the above references have recorded this species from about the British Isles, in the Clare Island region "widely distributed and often very common," and from the west coast of Scotland and off South Cornwall.

I have found no specimens referable to this species from the western Atlantic.

LAGENA ACUTICOSTA Reuss.

Plate 1, figs. 1-3.

Lagena acuticosta Reuss, Sitz. Akad. Wiss. Wien, vol. 44, pt. 1, 1861 (1862), p. 305, pl. 1, fig. 4; vol. 46, pt. 1, 1862 (1863), p. 331, pl. 5, fig. 63.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 464, pl. 57, figs. 31, 32; pl. 58, figs. 20 (?), 21.—Pearcey, Trans. Glasgow Nat. Hist. Soc., vol. 2, 1890, p. 177.—Egger, Abh. kön. bay. Akad. Wiss. München, Cl. II, vol. 18, 1893, p. 329, pl. 10, figs. 47, 48, 82, 83.—Wright, Irish Nat., vol. 9, no. 3, 1900, p. 53.—Millett, Journ. Roy. Micr. Soc., 1901, p. 8.—Chapman, The Foraminifera, 1902, p. 402.—Heron-Allen and Earland, Journ. Roy. Micr. Soc., 1909, p. 423.—Chapman, Subantarctic Ids. N. Zealand, 1909, p. 334; Journ. Linn. Soc. Zool., vol. 30, 1910, p. 407.—Sidebottom, Mem. Proc. Manchester Lit. Philos. Soc., vol. 54, no. 16, 1910, p. 16; Journ. Quekett Micr. Club, vol. 11, 1912, p. 388, pl. 15, fig. 22.—Bagg, Bull. 513, U. S. Geol. Survey, 1912, p. 45, pl. 14, fig. 28.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 23, pl. 8, figs. 9, 10; pl. 28, fig. 2.—Pearcey, Trans. Roy. Soc. Edinb., vol. 49, 1914, p. 1017.—Heron-Allen and Earland, Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 247.—Mestayer, Trans. New Zealand Inst., vol. 48, 1916, p. 129.—Cushman, Proc. U. S. Nat. Mus., vol. 56, 1919, p. 610; Bull. 100, U. S. Nat. Mus., vol. 4, 1921, p. 180.

Lagena sulcata (Walker and Jacob), var. *acuticosta* H. B. Brady, Parker, and Jones, Trans. Zool. Soc. London, vol. 12, 1888, p. 222, pl. 44, figs. 26, 31.

Description.—Test subglobular to pyriform, broadest near the base, which is broadly rounded, thence gradually tapering to the apertural end, the body of the test with a number of thin, much elevated costae, running from the base to near the apertural end, where they become coalesced into a platelike area below the aperture.

Length up to 0.35 mm.

Distribution.—This is one of the common species of the genus and seems to be widely distributed, as the above list of references will show. There are certain forms which seem to occur with a definite geographical distribution, and it may be that closer work with large collections from various parts of the world will show more than one species included under this name. Specimens from the western Atlantic were well developed in the warmer waters of the Gulf of Mexico and the Caribbean. Specimens were numerous in a collection which I had sent me by Mr. Sidebottom from off the coast of Iceland, but they are different in certain characters from those of the Gulf of Mexico. They seem to show that there is a difference in the characters from widely separated regions. There seem to be very few records for this species from about the British Isles.

Lagena acuticosta—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
19047	U.S.N.M.	1	D2150....	13 34 45 N.; 81 21 10 W..	382	45.8	wh. crs. s...	Rare.
19048	U.S.N.M.	1	D2318....	24 25 45 N.; 81 46 00 W..	45	75.0	co...........	Rare.
19049	U.S.N.M.	2	D2358....	20 19 00 N.; 87 03 30 W..	222	....	fne. wh. co..	Rare.
19050	U.S.N.M.	3	D2395....	28 36 15 N.; 86 50 00 W..	347	44.1	gy. m.......	Few.
19051	U.S.N.M.	1	D2399....	28 44 00 N.; 86 18 00 W..	196	51.6	gy. m.......	Rare.
19052	U.S.N.M.	4	D2400....	28 41 00 N.; 86 07 00 W..	169	....	gy. m.......	Few.
19053	U.S.N.M.	5	D2614....	34 09 00 N.; 76 02 00 W..	168	....	gy.s, bk. sp.	Few.
19054	U.S.N.M.	1	D2641....	25 11 30 N.; 80 10 00 W..	60	69.2	co. s.........	Rare.
19055	U.S.N.M.	1	D2644....	25 40 00 N.; 80 00 00 W..	193	43.4	gy. s.........	Rare.
19056	U.S.N.M.	1	....	Off Sand Key, Fla.......	92	....	....	Rare.
......	J.A.C....	1	....	Off Cape Porpoise, Me....	8	....	....	Rare.
......	J.A.C....	10+	....	Coast of Iceland..........	......	....	....	Abundant.

LAGENA ADVENA, new species.

Plate 1, fig. 4.

Lagena striata H. B. BRADY (part) (not D'ORBIGNY), Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, pl. 57, fig. 30.—SIDEBOTTOM (part), Journ. Quekett Micr. Club, vol. 11, 1912, p. 389, pl. 15, fig. 9.

Lagena striata (D'ORBIGNY), var. *haidingeri* CUSHMAN (not Czjzek), Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 19, pl. 7, fig. 6; Bull. 100, U. S. Nat. Mus., vol. 4, 1921, p. 178.

Description.—Test composed of two distinct parts, a globular body and a polygonal tapering neck, the basal end of the test broadly rounded with a few short, somewhat divergent spines, the main body of the test superficially with numerous very closely set longitudinal costae, which are underlain by a layer with transverse lines, as is shown by moistening the wall; aperture at the end of a many-sided pyramidal neck, the sides somewhat concave, the angles plate-like.

Length, up to 0.55 mm.

Distribution.—Type-specimen (U.S.N.M. Cat. No. 19042) from *Albatross* station D2150, in 382 fathoms (697 meters) in the Caribbean. Brady figures this species, but I am unable to say where his material was from. I have had specimens from the Pacific from off the Galapagos Islands and the Philippines. Sidebottom's material was from the Southwest Pacific.

Lagena advena—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
19042	U.S.N.M.	1	D2150....	13 34 45 N.; 81 21 10 W..	382	45.8	wh. crs. s....	Rare.

LAGENA ANNECTENS Burrows and Holland.

Heron-Allen and Earland record this species as scantily represented west of Scotland[1] and rare off South Cornwall.[2]

LAGENA APICULATA (Reuss).

Plate 1, fig. 5.

Oolina apiculata Reuss, in Haidinger's Nat. Abhandl., vol. 4, 1850, p. 22, pl. 1, fig. 1.

Lagena apiculata Reuss, Sitz. Akad. Wiss. Wien, vol. 46, pt. 1, 1862 (1863), p. 319, pl. 1, figs. 4–8, 10, 11.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 453, pl. 56, figs. 4, 15–18.—Goës, Kongl. Svensk. Vet. Akad. Handl., vol. 25, 1894, p. 80, pl. 13, fig. 747.—Sidebottom, Journ. Quekett Micr. Club, vol. 11, 1912, p. 381, pl. 14, fig. 16 (not figs. 17, 18).—Cushman, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 18.

Description.—Test subglobose, smooth, entosolenian, but slightly if at all compressed, apical end with a pointed spine, variable in length.

Length 0.50 mm.

Distribution.—There is a single specimen from the western Atlantic *Albatross* material which can be referred to this species of Reuss. It is like that figured by Sidebottom in the above reference, but not at all like his figures 17 and 18 which are here referred to *Lagena felsinea* Fornasini.

Lagena apiculata—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
19125	U.S.N.M.	1	D2205....	39 35 00 N.; 71 18 45 W..	1,073	38.1	gy. oz.......	Rare.

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[1] Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 250.

[2] Journ. Roy. Micr. Soc., 1916, p. 46.

LAGENA ASPERA Reuss.

Plate 1, figs. 6-8.

Lagena aspera Reuss, Sitz. Akad. Wiss. Wien, vol. 44, 1861, p. 305, pl. 1, fig. 5; vol. 46, pt. 1, 1862 (1863), p. 335, pl. 6, fig. 81.—Balkwill and Wright, Proc. Roy. Irish Acad., ser. 2, vol. 3, 1882, p. 548.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 457, pl. 57, figs. 7-10.—Balkwill and Wright, Trans. Roy. Irish Acad., vol. 28, 1885, p. 337, pl. 14, figs. 10-12.—H. B. Brady, Journ. Roy. Micr. Soc., 1887, p. 902.—Wright, Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 478.—Egger, Abh. kön. bay. Akad. Wiss. München, Cl. II, vol. 18, 1893, p. 325, pl. 10, fig. 11.—Wright, Irish Nat., vol. 9, No. 3, 1900, p. 53.—Balkwill and Millett, Rec. Foram. Galway, 1908, p. 5.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 16, pl. 16, fig. 1.—Heron-Allen and Earland, Trans. Linn. Soc. London, ser. 2, vol 11, 1916, p. 243; Journ. Roy. Micr. Soc., 1916, p. 44.

Description.—Test flask-shaped, usually globular with a short stout neck; surface ornamented with an irregularly placed series of beadlike blunt spines.

Length up to 0.60 mm.

Distribution.—All the Atlantic records for this species seem to be from off the British Isles. I have no specimens which I could refer to it from the western Atlantic.

LAGENA BICARINATA (Terquem).

Plate 1, fig. 9.

Fissurina bicarinata Terquem, Mem. Soc. Géol. France, ser. 3, vol. 2, 1882, p. 31, pl. 1, figs. 24*a*, *b*.

Lagena bicarinata Balkwill and Wright, Trans. Roy. Irish Acad., vol. 28, 1885, p. 342.—H. B. Brady, Journ. Roy. Micr. Soc., 1887, p. 905.—Wright, Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 482.—Balkwill and Millett, Rec. Foram. Galway, 1908, p. 6.—Heron-Allen and Earland, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 89; Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 254; Journ. Roy. Micr. Soc., 1916, p. 46.

Nearly all the Atlantic records for this species are from about the British Isles, where it seems to be fairly common. I have had no specimens from the western Atlantic.

LAGENA BOTELLIFORMIS H. B. Brady.

Plate 1, fig. 10.

Lagena botelliformis H. B. Brady, Quart. Journ. Micr. Sci., vol. 21, 1881, p. 60; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 454, pl. 56, fig. 6.—Wright, Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 477.—Millett, Journ. Roy. Micr. Soc., 1901, p. 492, pl. 8, fig. 15.—Sidebottom, Mem. Proc. Manchester Lit. Philos. Soc., vol. 50, No. 5, 1906, p. 2, pl. 1, fig. 1.—Chapman, Journ. Linn. Soc. Zool., vol. 30, 1910, p. 407, pl. 54, fig. 5.—Heron-Allen and Earland, Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 242.

The above references include two Atlantic records, one from off the southwest of Ireland, and one from the west of Scotland. I have found no material in the western Atlantic *Albatross* collections referable to this species.

LAGENA CASTANEA Flint.

Plate 1, figs. 12, 13.

Lagena castanea Flint, Rep. U. S. Nat. Mus., 1897 (1899), p. 307, pl. 54, fig. 3.

Description.—Test small, somewhat compressed, about as long as broad, margin rounded and smooth, except at the lower side which has a double keel, the two parts well separated from one another, joining each other at the sides of the test, the upper half of the test with no trace of a keel, apertural end slightly extended; wall smooth, thin, transparent; aperture with an entosolenian tube which in some cases at least is spirally twisted.

Length about 0.50 mm.

Distribution.—The type station for this species is in 896 fathoms (1,639 meters), off Panama, in the Caribbean. I have had numerous specimens from this same station, but have not seen it elsewhere in the *Albatross* dredgings.

Lagena castanea—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°*F.*		
19061	U.S.N.M.	5	D2144....	9 49 00 N.; 79 31 30 W..	896	....	gn. m.......	Few.

LAGENA CATENULATA (Williamson).

Plate 1, fig. 11.

Entosolenia squamosa Montagu, var. *catenulata* Williamson, Rec. Foram. Great Britain, 1858, p. 13, pl. 1, fig. 31.

Lagena catenulata Reuss, Sitz. Akad. Wiss. Wien, vol. 46, pt. 1, 1862 (1863), p. 325, pl. 3, fig. 29.—Parker and Jones, Philos. Trans., vol. 155, 1865, p. 352, pl. 16, fig. 7.—Balkwill and Millett, Journ. Micr., vol. 3, 1884, p. 78, pl. 1, fig. 9.

Description.—Test subglobular, slightly longer than broad, the basal end broadly rounded, the apertural end slightly drawn out; surface ornamented by a generally polygonal ornamentation, in more or less regular vertical rows, the test translucent.

Length up to 0.25 mm.

Distribution.—Specimens which seem to fit this species occur commonly off the coast of the British Isles, so far as the material I have had shows, but no specimens were found in the western Atlantic material referable to it.

Lagena catenulata—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
						°*F.*		
......	J.A.C....	4	*Lord Bandon* Log 28.	Off Baltimore, southwest Ireland.	26	......	....	Few.
......	J.A.C....	1	*Lord Bandon* Log 58.	Off Bantry Bay, southwest Ireland.	110	......	....	Rare.
......	J.A.C....	10	*Flying Falcon* Log 8.	10 miles off Glencoe, southwest Ireland.	53	......	m., s........	Common.
......	J.A.C....	2	....	Dog's Bay, Ireland......	......	......	....	Rare.

LAGENA CHRYSALIS Heron-Allen and Earland.

Plate 1, fig. 14.

Lagena chrysalis HERON-ALLEN and EARLAND, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 74, pl. 6, fig. 4.

Description.—"Test chrysalidiform, tapering at both extremities, the aboral end much more acute than the oral, which is neatly rounded off. Aboral extremity either pointed or slightly tumescent at the apex; surface smooth, somewhat dull, but girdled at intervals by four to six clear lines in the shell-substance which enhance the general resemblance of the shell to the chrysalis of a moth. Length, 0.21 mm.; breadth, 0.08 mm. Aperture simple. There is a slight constriction in the shell wall on either side of the clear lines.

"The general appearance of this little test is glanduline, resembling a minute specimen of *Nodosaria radicula*, but there is no trace whatever of internal septa.

"Three specimens found at station 13 (Inishgowla harbour, 4 fathoms)."

This is the only record for this species.

LAGENA CLAVATA (D'Orbigny).

Plate 1, fig. 15.

Oolina clavata D'ORBIGNY, Foram. Foss. Vienne, 1846, p. 24, pl. 1, fig. 2.

Lagena clavata MACKIE, Recreative Science, vol. 1, 1859, p. 148, fig. 13.—REUSS, Sitz. Akad. Wiss. Wien, vol. 46, pt. 1, 1862 (1863), p. 320, pl. 1, figs. 13, 14.—TERQUEM, Mém. Soc. Géol. France, ser. 3, vol. 2, 1882, p. 25, pl. 1 (9), fig. 2.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 456; Journ. Roy. Micr. Soc., 1887, p. 902.—Robertson, Proc. Nat. Hist. Soc. Glasgow, pt. 3, 1892, p. 241.—Egger, Abh. kön. bay. Akad. Wiss. München, Cl. II, vol. 18, 1893, p. 324, pl. 10, fig. 68.—Haeusler, Abh. schweiz. Pal. Ges., vol. 20, 1893, p. 14, pl. 1, figs. 17–22.—Goës, Kongl. Svensk. Vet. Akad. Handl., vol. 25, No. 9, 1894, p. 75, pl. 13, figs. 725–727.—Morton, Proc. Portland Soc. Nat. Hist., vol. 2, pt. 4, 1897, p. 116, pl. 1, fig. 2.—Fornasini, Mem. Accad. Sci. Ist. Bologna, ser. 5, vol. 7, 1897 (1898), p. 14 (206), pl., fig. 18.—Wright, in Meade, Geol. Mag., dec. 4, vol. 7, 1900, p. 100, pl. 5, fig. 13.—Millett, Journ. Roy. Micr. Soc., 1901, p. 490.—Balkwill and Millett, Rec. Foram. Galway, 1908, p. 5.—Sidebottom, Mem. Proc. Manchester Lit. Philos. Soc., vol. 54, No. 16, 1910, p. 16.—Cushman, Bull. 71, pt. 3, 1913, p. 9, pl. 2, fig. 3.—Heron-Allen and Earland, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 80; Trans. Zool. Soc. London, vol. 20, 1915, p. 660, pl. 50, fig. 23; Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 248; Journ. Roy. Micr. Soc., 1916, p. 45.

Lagena laevis (Walker and Jacob), var. *amphora* Williamson, Ann. Mag. Nat. Hist., ser. 2, vol. 1, 1848, p. 12, pl. 1, figs. 3, 4.

Lagena laevis Haeusler, Neues Jahrb., 1887, pt. 1, p. 181, pl. 4, figs. 39–48; Abh. schweiz. Pal. Ges., vol. 17, 1890, p. 86, pl. 13, figs. 17, 18.

Lagena vulgaris Williamson, var. *clavata* Williamson, Rec. Foram. Great Britain, 1858, p. 5, pl. 1, fig. 6.

Lagena laevis (Montagu), var. *clavata* Wright, Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 478.

Description.—Test elongate, clavate or fusiform, with a long neck at the oral end and an elongation of the test somewhat variable in length at the aboral end; surface smooth, cross section nearly circular; wall thin and transparent; aperture nearly circular, at the end of the neck, often with a phialine lip.

Length up to 1 mm.

Distribution.—This species is common about the British Isles, as the above references show, and material which I have had from stations mainly from off the coast of Ireland. It has occurred rarely in the *Albatross* western Atlantic collections, single specimens from two stations being all that I have found.

Lagena clavata—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°*F.*		
19123	U.S.N.M.	1	D2144....	9 49 00 N.; 79 31 30 W..	896	....	gn. m.......	Rare.
19124	U.S.N.M.	1	D2262....	39 54 45 N.; 69 29 45 W..	250	41.6	gn. m., s....	Rare.
......	J.A.C....	5	....	*Lord Bandon* Log 28, off Baltimore, southwest Ireland.	26	....	....	Few.
......	J.A.C....	8	....	*Flying Falcon* Log 8, 10 miles off Glencoe, southwest Ireland.	53	....	m., s........	Common.
......	J.A.C....	1	....	Dog's Bay, Ireland......	......	....	....	Rare.

LAGENA COSTATA (Williamson).

Plate 1, fig. 16; pl. 2, figs. 1, 2; pl. 3, fig. 8.

Entosolenia costata WILLIAMSON, Rec. Foram. Great Britain, 1858, p. 9. pl. 1, fig. 18.

Lagena costata REUSS, Sitz. Akad. Wiss. Wien, vol. 46, pt. 1, 1862 (1863). p. 329, pl. 4, fig. 54.—BALKWILL and WRIGHT, Proc. Roy. Irish Acad., ser. 2, vol. 3, 1882, p. 547; Trans. Roy. Irish Acad., vol. 28, 1885, p. 338, pl. 14, figs. 3–5.—H. B. BRADY, Journ. Roy. Micr. Soc., 1887, p. 903.—WRIGHT, Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 479; Irish Nat., vol. 9, No. 3, 1900, p. 53.—MILLETT, Journ. Roy. Micr. Soc., 1901, p. 7, pl. 1, fig. 8.—WRIGHT, Irish Nat., vol. 11, 1902, p. 213.—SIDEBOTTOM, Journ. Quekett Micr. Club, vol. 11, 1912, p. 388, pl. 15, figs. 16–20.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 21, pl. 9, fig. 6; pl. 10, fig. 1; pl. 12, fig. 1.—HERON-ALLEN and EARLAND, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 75; Trans. Zool. Soc. London, vol. 20, 1915, p. 656; Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 243; Journ. Roy. Micr. Soc., 1916, p. 45.

Description.—Test subglobular, ornamented with a few rather remote ribs or costae running nearly the length of the test, frequently not reaching the apex, but ending in a ring of spinose projections; aperture small and rounded; costae most often rounded.

Length 0.25–0.50 mm.

Distribution.—Most of the references for this species are from the region of the British Isles, where it is one of the most typical species. especially off the Irish and Scottish coasts, where it is recorded at numerous stations, especially by Heron-Allen and Earland. I have failed to find typical specimens in the western Atlantic material I have examined.

LAGENA CRENATA Parker and Jones.

Plate 2, figs. 3, 4.

Lagena crenata PARKER and JONES, Philos. Trans., vol. 155, 1865, p. 420, pl. 18, figs. 4*a*, *b*.—BALKWILL and WRIGHT, Trans. Roy. Irish Acad., vol. 28, 1885, p. 339, pl. 14, figs. 17, 18.—H. B. BRADY, Journ. Roy. Micr. Soc., 1887, p. 904.—WRIGHT, Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891. p. 479.—CHAPMAN, Journ. Linn. Soc. London, vol. 28, 1900, p. 246.—MILLETT, Journ. Roy. Micr. Soc., 1901, p. 485, pl. 8, fig. 1.—SIDEBOTTOM, Journ. Quekett Micr. Club, vol. 12, 1913, p. 174, pl. 15, fig. 28.—HERON-ALLEN and EARLAND, Trans. Zool. Soc. London, vol. 20, 1915, p. 658.

Description.—Test flask-shaped, with the base truncate, the base at the edge crenulate, each of the crenulations marking a fold of the base; the neck elongate, usually with a spiral ornamentation, the remainder of the test smooth.

Length 0.30–0.50 mm.

Distribution.—This species was originally described by Parker and Jones, off the coast of Australia. There are, however, several records for it off the coast of the British Isles. It has not occurred in the western Atlantic material.

LAGENA CURVILINEATA Balkwill and Wright.

Plate 2, figs. 5–9.

Lagena curvilineata Balkwill and Wright, Proc. Roy. Irish Acad., ser. 2, vol. 3, 1882, p. 548; Trans. Roy. Irish Acad., vol. 28, 1885, p. 338, pl. 14, figs. 21–24.—H. B. Brady, Journ. Roy. Micr. Soc., 1887, p. 902.—Millett, Journ. Roy. Micr. Soc., 1901, p. 488, pl. 8, fig. 5.—Balkwill and Millett, Rec. Foram. Galway, 1908, p. 5.—Heron-Allen and Earland, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 78, pl. 6, fig. 7.

Description.—"Flask-shaped, surface ornamented with fine curvilinear striae. In typical examples the striae commence from centres situated at opposite sides of the shell, round which they are twisted in the most beautifully regular manner. In some specimens the striae cross, giving the shell a decussated appearance."

Distribution.—This beautifully ornamented species, except for the one reference of Millett, seems to be limited to the region of the British Isles. I have found no material from the *Albatross* western Atlantic collections.

LAGENA CYMBULA Heron-Allen and Earland.

Plate 3, fig. 1.

Lagena cymbula Heron-Allen and Earland, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 90, pl. 7, figs. 16–18.

Description.—"Test oval, depressed, shaped like a punt with rounded ends, the superior face concave, the inferior convex. Aperture situated in the centre of the depression and furnished with an entosolenian tube, which is attached to the interior of the shell, and follows the outline of the shell up the sloping side of the central depression, passing across to the edge and so down the side of the 'punt' to the middle of the base. In transverse section *L. cymbula* would resemble an inverted triangle of which the basal angles have been rounded off and the inferior or apical portion truncated.

"Length, 0.13–0.16 mm.; breadth, 0.05–0.08 mm.; depth, 0.03–0.04 mm.; oval central depression averages 0.02 by 0.04 mm.; tube about 0.01 diameter.

"The affinities of this curious little species lie about midway between *L. cymbaeformis* Millett, which has a test of somewhat similar outline, but is more regularly naviculoid, being sub-acute at both extremities and sloping to a broad keel beneath, and *L. depressa* Chaster, which is more circular than our species, and is of the same breadth on both the oral and the aboral sides. The three species form a very interesting and unique little group, characterized by the presence of the aperture in what would in a normal *Lagena* represent the middle of one lateral surface of the test.

"Mr. Millett's species is described as 'rare' from the Pliocene of St. Erth, and Dr. Chaster found three specimens of *L. depressa* at Southport. We have one specimen of *L. cymbula* from Station 13, but have met with others in 'Goldseeker' dredgings from Noss Head in the Moray Firth (72 meters) which are larger than the Clare Island specimen. It also occurs in a dredging made by the Fisheries Cruiser 'Huxley' in the English North Sea (Haul 869), to which we are referring elsewhere, and in company with *L. depressa* Chaster, in Scapa Flow, Orkney."

The above is the original description, with notes by Heron-Allen and Earland. They also record a single specimen from the west of Scotland.

LAGENA DISTOMA Parker and Jones.

Plate 3, figs. 2, 3.

Lagena laevis (MONTAGU), var. *striata* PARKER and JONES (not *L. striata* (Walker and Boys)), Ann. Mag. Nat. Hist., ser. 2, vol. 19, 1857, p. 278, pl. 11, fig. 24.

Lagena distoma PARKER and JONES in H. B. Brady, Trans. Linn. Soc. London, vol. 24, 1864, p. 467, pl. 48, fig. 6.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 461, pl. 58, figs. 11–15; Journ. Roy. Micr. Soc., 1887, p. 902.—WRIGHT, Ann. Mag. Nat. Hist., vol. 4, ser. 6, 1889, p. 448.—ROBERTSON, Proc. Nat. Hist. Soc. Glasgow, pt. 3, 1892, p. 241.—PEARCEY, Trans. Glasgow Nat. His. Soc., vol. 2, 1890, p. 177.—WRIGHT, Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 478.—WOODWARD, The Observer, vol. 4, 1893, p. 142.—WHITEAVES, Geol. Survey Canada, 1901, p. 10.—KIAER, in Duc d'Orleans Croisière Ocean, Mer du Gronland, 1905 (1907), p. 560.—PEARCEY, Trans. Roy. Soc. Edinb., vol. 49, 1914, p. 1017.—HERON-ALLEN and EARLAND, Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 248.

Description.—Test elongate, the main body of the test fusiform, the sides nearly parallel in the central portion, apertural end tapering into a very long slender neck with a phialine lip, the other end tapering into a long acicular spine which is hollow part way to the end; surface of the test smooth except for slightly raised fine costae, 6–10 in number; wall thin and transparent.

Length up to 2.50 mm.

Distribution.—In the western Atlantic this species is fairly common at some of the *Albatross* stations off the eastern coast of the United States, with a few stations in the Caribbean.

There are numerous records for this species off the coast of the British Isles. In the Summary of Results of the *Challenger* Expedition the species is recorded from the Atlantic at two stations, off the eastern coast of the United States, in the same general region where the *Albatross* material occurs in considerable abundance. It is also known from the Gulf of St. Lawrence, off the Island of

Anticosti, and off Newfoundland. There are a few scattered records for it outside the Atlantic.

The specimens reach a large size and where complete show a very distinct apertural end which is very slender and therefore very easily broken. The opposite end is drawn out into a long spinose projection which in perfect specimens is closed, but it easily becomes broken. The majority of specimens therefore are similar to those figured by Parker and Jones, showing the two ends open. I have already noted under this genus that I do not think any of the typical *Lagenae* have the two ends of the test open in perfect specimens.

Lagena distoma—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°*F.*		
19004	U.S.N.M.	4	D2003....	37 16 30 N.; 74 20 36 W..	641	....	....	Few.
19005	U.S.N.M.	1	D2038....	38 30 30 N.; 69 08 25 W..	2,033	....	glob. oz.....	Rare.
19006	U.S.N.M.	1	D2105....	37 50 00 N.; 73 03 50 W..	1,395	41.0	glob. oz.....	Rare.
19007	U.S.N.M.	10+	D2112....	35 20 50 N.; 75 18 00 W..	16	73.5	s., blk. sp...	Abundant.
19008	U.S.N.M.	1	D2116....	35 45 23 N.; 74 31 25 W..	888	39.0	bu. m., fne. s.	Rare.
19009	U.S.N.M.	1	D2144....	9 49 00 N.; 79 31 30 W..	896	....	gn. m.......	Rare.
19010	U.S.N.M.	1	D2150....	13 34 45 N.; 81 21 10 W..	382	45.8	wh. crs. s....	Rare.
19011	U.S.N.M.	1	D2171....	37 59 30 N.; 73 48 40 W..	444	39.5	gn. m.......	Rare.
3146	U.S.N.M.	4	D2212....	39 59 30 N.; 70 30 45 W..	428	40.0	gn. m.......	Abundant.
19012	U.S.N.M.	10+						
19013	U.S.N.M.	1	D2226....	37 00 00 N.; 71 54 00 W..	2,045	36.8	glob. oz.....	Rare.
19014	U.S.N.M.	2	D2232....	39 54 45 N.; 69 29 45 W..	250	41.6	gn. m., s....	Rare.
19015	U.S.N.M.	1	D2552....	39 47 97 N.; 70 35 00 W..	721	39.6	gy. oz.......	Rare.
19016	U.S.N.M.	1	D2581....	39 43 00 N.; 71 34 00 W..	394	....	gn. m.......	Rare.
19017	U.S.N.M.	3	D2677....	32 39 00 N.; 76 50 30 W..	478	39.3	gn. m.......	Few.
19018	U.S.N.M.	1	D2710....	40 06 00 N.; 68 01 00 W..	984	....	gn. m.......	Rare.
19019	U.S.N.M.	1	H82......	13 29 00 N.; 62 42 40 W..	1,051	....	for., m......	Rare.

LAGENA ELONGATA (Ehrenberg).

Plate 3, fig. 4.

Miliola elongata Ehrenberg, Bericht. preuss. Akad. Wiss. Berlin, 1844, p. 274, 1845, p. 371; Mikrogeologie, 1854, pl. 25, fig. 1.

Lagena elongata Tate and Blake, Yorkshire Lias, 1876, p. 454, pl. 18, figs. 9, 9*a*.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 457, pl. 56, fig. 29.—Goës, Kongl. Svensk. Vet. Akad. Handl., vol. 25, No. 9, 1894, p. 75, pl. 13, fig. 731.—Flint, Rep. U. S. Nat. Mus., 1897 (1899), p. 306, pl. 53, fig. 1.—Pearcey, Trans. Glasgow Nat. Hist. Soc., vol. 2, 1890, p. 177.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 12, pl. 1, fig. 5.

Lagena gracillima H. B. Brady (part), Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, pl. 56, figs. 27, 28.—Goës, Kongl. Svensk. Vet. Akad. Handl., vol. 25, No. 9, 1894, pl. 13, figs. 728, 730 (not 729).

Description.—Test elongate, slender, the central portion subcylindrical, the ends rather tapering, apertural end with a slightly thickened lip, opposite end closed; wall translucent, smooth.

Length up to 1.50 mm.

Distribution.—The only station from which I have had material that can be referred to this species is off the northern coast of South America, east of Trinidad. There are a few records for it off the British Isles, and Goës records it from off Greenland and Spitzbergen. There are a few scattered records for it elsewhere than in the Atlantic.

This has probably been confused with *L. gracillima* (Seguenza). This differs from *L. gracillima* in the more cylindrical body, and much shorter projections at the ends. The test is also thicker and less transparent.

Lagena elongata—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
19032	U.S.N.M.	1	D2754....	° ′ ″ 11 40 00 N.; ° ′ ″ 58 33 00 W..	880	°*F.* 38.0	glob. oz.,...	Rare.

LAGENA FABA Balkwill and Millett.

Lagena faba Balkwill and Millett, Journ. Micr., vol. 3, 1884, p. 81, pl. 2, fig. 10; pl. 3, fig. 7.—H. B. Brady, Journ. Roy. Micr. Soc., 1887, p. 905.

Lagena fasciata Egger, var. *faba* Balkwill and Millett, Rec. Foram. Galway, 1908, p. 6.—Heron-Allen and Earland, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 84; Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 250.

The only specimens of this species known seem to be those recorded by Balkwill and Millett from off Galway, and those recorded by Heron-Allen and Earland from the Clare Island region and from off the west coast of Scotland.

LAGENA FALCATA Chaster.

Plate 3, figs. 5–7.

Lagena falcata Chaster, First Rep. Southport Soc. Nat. Sci., 1890–1891 (1892), p. 61, pl. 1, fig. 7.—Heron-Allen and Earland, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 82, pl. 6, figs. 12, 13; Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 249, pl. 41, fig. 25.

The only records for this species are from off the coast of the British Isles, Chaster's figure being from off Southport, and those of Heron-Allen and Earland from *Goldseeker* dredgings off Noss Head, Moray Firth, 70 meters (38 fathoms), and other stations off the coasts of Scotland and Ireland.

LAGENA FASCIATA Egger.

Heron-Allen and Earland[8] record this species as abundant at most of the stations in the Clare Island region, and also report it as widely distributed off the west of Scotland.[4] There seem to be no other Atlantic references.

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[8] Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 83.

LAGENA FELSINEA Fornasini.

Lagena vulgaris (Parker and Jones), var. (*Entosolenia*) *globosa* Rymer-Jones, Trans. Linn. London, vol. 30, 1872, pl. 19, fig. 2 (not *Lagena globosa* (Montagu)).

Lagena apiculata H. B. Brady (part), Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, pl. 56, fig. 4.—Sidebottom (part), Journ. Quekett Micr. Soc., vol. 11, 1912, p. 381, pl. 14, figs. 17, 18 (not fig. 16).

Lagena emaciata Reuss, var. *felsinea* Fornasini, Mem. Accad. Ist. Bologna, ser. 5, vol. 9, 1901, p. 47, fig. 1.

Lagena felsinea Cushman, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 10, pl. 4, fig. 1.

Description.—Test elongate, subcylindrical, arcuate in side view, especially toward the apertural end, aboral end broader, rounded, or slightly acute; wall thin, smooth; aperture eccentric, rounded, with a long entosolenian neck somewhat inflated at its inner end.

Length about 0.70 mm.; diameter about 0.25 mm.

Distribution.—Specimens which can be referred to the above species occur at several stations off the northeastern coast of the United States, with a single specimen from *Albatross* D2160, in the Caribbean. These specimens are very similar to that which I have figured from the North Pacific, and which Sidebottom has figured as *Lagena apiculata* from the Southwest Pacific.

Lagena felsinea—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
19136	U.S.N.M.	1	D2035....	39 26 16 N.; 70 02 37 W..	1,362	....	glob. oz.....	Rare.
19137	U.S.N.M.	4	D2041....	39 22 50 N.; 68 25 00 W..	1,608	38	glob. oz.....	Few.
19138	U.S.N.M.	2	D2043....	39 49 00 N.; 68 28 30 W..	1,467	38.5	glob. oz.....	Rare.
19139	U.S.N.M.	1	D2160....	23 10 31 N.; 82 20 37 W..	167	....	co...........	Rare.

LAGENA FIMBRIATA H. B. Brady.

Plate 3, fig. 9.

Lagena fimbriata H. B. Brady, Quart. Journ. Micr. Sci., vol. 21, 1881, p. 61; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 486, pl. 60, figs. 26–28; Journ. Roy. Micr. Soc., 1887, p. 907.—Pearcey, Trans. Glasgow Nat. Hist. Soc., vol. 2, 1890, p. 177.—Wright, Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 480.—Egger, Abh. kön. bay. Akad. Wiss. München, Cl. II, vol. 18, 1893, p. 333, pl. 10, figs. 15, 16.—Chapman, Proc. Zool. Soc. London, pt. 1, 1895, p. 28.—Wright, Irish Nat., vol. 9, No. 3, 1900, p. 54.—Sidebottom, Mem. Proc. Manchester Lit. Philos. Soc., vol. 50, No.

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[4] Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 25.

5, 1906, p. 14.—BALKWILL and MILLETT, Rec. Foram. Galway, 1908, p. 6.—CHAPMAN, Journ. Linn. Soc. Zool., vol. 30, 1910, p. 411.—SIDEBOTTOM, Mem. Proc. Manchester Lit. Philos. Soc., vol. 54, No. 16, 1910, p. 19.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 30, pl. 14, fig. 8.—HERON-ALLEN and EARLAND, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 89, pl. 7, fig. 14.—PEARCEY, Trans. Roy. Soc. Edinb., vol. 49, 1914, p. 1021.—HERON-ALLEN and EARLAND, Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 255.

Lagena orbignyana (?) SIDEBOTTOM, Journ. Quekett Micr. Club, vol. 11, 1912, p. 418, pl. 21, fig. 15.

Description.—"Test pyriform or flask-shaped, broad at the base, compressed; ento- or ectosolenian; furnished with a deep vertical wing, encircling the oval base; the wing traversed by parallel tubuli, and sometimes fringed at the free margin."

Length, 0.42 mm.

Distribution.—There are numerous records for this species from about the British Isles and elsewhere, but I have seen no specimens referable to it from the western Atlantic *Albatross* collections.

LAGENA FLINTIANA, new species.

Plate 3, figs. 11–13.

Lagena orbignyana FLINT (not Seguenza), Rep. U. S. Nat. Mus., 1897 (1899), p. 308, pl. 54, fig. 4.

Description.—Test somewhat compressed, longer than broad, the basal end broadly rounded, the apertural end much drawn out, body of the test rounded, completely encircled with a thin single keel, inside of which is a slight thickening of the test, but which does not stand up into a prominent ridge of any extent; wall translucent except for the peculiar thickenings which occur about the border of the body of the test, and especially across the base where the entire wall becomes clouded, as a result apparently of numerous small thickenings which are abundant in that particular portion; aperture tubular, entosolenian, but with an elongate tube in the body cavity.

Length up to 0.75 mm.

Distribution.—Type-specimen (U.S.N.M. Cat. No. 19064) from *Albatross* station D2144, in 896 fathoms (1,639 meters), in the Caribbean. Flint records this species as *Lagena orbignyana* Seguenza, but a study of the material from his station shows that he had a very different species. His stations are in the northern part of the Gulf of Mexico, in the Caribbean, between Cuba and Yucatan, off Panama, and west of the Windward Islands. I have had numerous specimens from these same regions. While it is impossible to say without consulting Brady's original material, it seems probable that the specimens he records as *Lagena orbignyana* from off the Virgin Islands and off the coast of Brazil are the same species.

Lagena flintiana—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
19084	U.S.N.M.	1	D2117....	15 24 20 N.; 63 31 30 W..	683	39.8	yl. m., fne. s.	Rare.
19064	U.S.N.M.	3	D2144....	9 49 00 N.; 79 31 20 W..	896	....	gn. m.......	Frequent.
19065	U.S.N.M.	3						
19066	U.S.N.M.	1	D2381....	28 05 00 N.; 87 56 15 W..	1,330	....	lt. br. m....	Rare.
19067	U.S.N.M	1	D2383....	28 32 00 N.; 88 06 00 W..	1,181	39.6	br. gn. m....	Rare.
19068	U.S.N.M.	3	D2392....	28 47 30 N.; 87 27 00 W..	724	40.7	br. gy. m....	Few.
19069	U.S.N.M	1	D2393....	28 43 00 N.; 87 14 30 W..	525	41.1	lt. gy. m....	Rare.
19070	U.S.N.M.	3	D2394....	28 38 30 N.; 87 02 00 W..	420	41.8	gn. m.......	Few.
19071	U.S.N.M.	2	D2751....	16 54 00 N.; 63 12 00 W..	687	40.0	bu. glob. oz..	Rare.
19085	U.S.N.M.	1	D2763....	24 17 00 S.; 42 48 30 W..	671	37.9	br. glob .oz..	Rare.

LAGENA FORFICULA Heron-Allen and Earland.

Plate 3, fig. 10.

Lagena forficula Heron-Allen and Earland, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 87, pl. 6, fig. 11.

Description.—" Test free, consisting of a compressed oval chamber, furnished with a long neck, at the extremity of which is a phialine rim produced sideways into two short recurved hooks. The base of the chamber is furnished with two solid spines curving inward like the pincers of an earwig, from which we have named the species.

" Total length, including neck and basal spines, 0.24 mm.; basal spines, 0.05 mm. in length; chamber, 0.12 mm. long, 0.08 mm. broad; neck, 0.07 mm. long; breadth across apical hooks, 0.08 mm.; maximum breadth of shell across basal spines, 0.09 mm.

"A single specimen of this extraordinary little form from Station 13. Broken individuals have been observed at one or two *Goldseeker* stations in the Moray Firth.

" Our species may be compared with that figured by Mr. Millett in 1901 (Journ. Roy. Micr. Soc., pl. 8, fig. 21) described as '*L. marginata* (Walker and Boys) var., very rare.' It agrees with Mr. Millett's specimens in the long neck with recurved spines at the oral extremity, but differs in the shape of the chamber, which is a compressed oval, whereas Mr. Millett's specimen was a marginate form, and also in the presence of the strongly curved aboral spines. These are entirely wanting in the Malay form, the aboral extremity of which terminated in a short, blunt process, outgrowing from the carina.

" The relationships of our species are evidently much closer to *L. laevigata* than to *L. marginata*, to which Mr. Millett referred his specimens. The presence of the long neck with recurved oral spines, common to both forms, is, however, very noticeable."

The above seems to be the only reference for this peculiar species.

LAGENA GRACILIS Williamson.

Plate 4, figs. 3, 4.

Lagena gracilis Williamson, Ann. Mag. Nat. Hist., ser. 2, vol. 1, 1848, p. 13, pl. 1, figs. 3, 4.—Reuss, Sitz. Akad. Wiss. Wien, vol. 46, pt. 1, 1862 (1863), p. 331, pl. 4, figs. 58–61; pl. 5, fig. 62.—Balkwill and Wright, Proc. Roy. Irish Acad., ser. 2, vol. 3, 1882, p. 548.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 464, pl. 58, figs. 2, 3, 7–9, 10 [?], 19, 22, 23, 24 [?].—Balkwill and Wright, Trans. Roy. Irish Acad., vol. 28, 1885, p. 338.—H. B. Brady, Jour. Roy. Micr. Soc., 1887, p. 903.—Pearcey, Trans. Glasgow Nat. Hist. Soc., vol. 2, 1890, p. 177.—Wright, Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 479.—Egger, Abh. kön. bay. Akad. Wiss. München, Cl. II, vol. 18, 1893, p. 328, pl. 10, figs. 25, 49.—Goës, Kongl. Svensk. Vet. Akad. Handl., vol. 25, No. 9, 1894, p. 77, pl. 13, fig. 738.—Chapman, Proc. Zool. Soc. London, pt. 1, 1895, p. 27.—Morton, Proc. Portland Soc., vol. 2, 1897, p. 117.—Millett, Journ. Roy. Micr. Soc., 1901, p. 482, pl. 8, figs. 12–14.—Kiaer, in Duc d'Orleans, Croisière Ocean, Mer du Gronland, 1905 (1907), p. 560.—Balkwill and Millett, Rec. Foram. Galway, 1908, p. 5.—Chapman, Subantarctic Ids. New Zealand, 1909, p. 333; Journ. Linn. Soc. Zool., vol. 30, 1910, p. 409.—Sidebottom, Mem. Proc. Manchester Lit. Philos. Soc., vol. 54, No. 16, 1910, p. 16.—Bagg, Bull. 513, U. S. Geol. Survey, 1912, p. 47, pl. 14, figs. 7, 8.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 24, pl. 8, figs. 5, 6.—Heron-Allen and Earland, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 81.—Pearcey, Trans. Roy. Soc. Edinb., vol. 39, 1914, p. 1017.—Chapman, Biol. Res. *Endeavour*, vol. 3, pt. 1, 1915, p. 21.—Heron-Allen and Earland, Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 248; Journ. Roy. Micr. Soc., 1916, p. 45.—Cushman, Bull. 100, U. S. Nat. Mus., vol. 4, 1921, p. 181.

Lagena vulgaris Williamson, var. *gracilis* Williamson, Rec. Foram. Great Britain, 1858, p. 7, pl. 1, figs. 12, 13.

Description.—Test elongate, fusiform, broadest in the middle, apertural end tapering into a long cylindrical neck with a slightly expanded lip, opposite end pointed; surface ornamented by a few distinct longitudinal costae, 6–12 in number.

Length up to 0.60 mm.

Distribution.—This species, originally described by Williamson, occurs in its typical form at many stations about the British Isles. It is recorded at very many localities elsewhere, but an examination of what few figures are given shows many different forms. I have seen British material from off the southwest of Ireland, and have one specimen from *Albatross* station D2534, in 1,234 fathoms (2,257 meters), off the northeastern coast of the United States, which seems typical.

Lagena gracilis—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
19059	U.S.N.M.	1	D2534....	40 01 00 N.; 67 29 15 W..	1,234	37.8	gy. oz.......	Rare.
......	J.A.C....	1	*Flying Falcon* Log 8.	10 miles off Glencoe, southwest Ireland.	53	....	m., s........	Rare.

LAGENA GRACILLIMA (Seguenza).

Plate 4, fig. 5.

Amphorina gracillima Seguenza, Foram. mon. Mioc. Messina, 1862, p. 51, pl. 1, fig. 37.

Lagena gracillima Jones, Parker, and H. B. Brady, Pal. Soc. Mon., vol. 19, 1866, p. 45, pl. 1, figs. 36, 37.—H. B. Brady, Ann. Mag. Nat. Hist., ser. 4, vol. 6, 1870, p. 292, pl. 11, figs. 6 *a–c*.—Bütschli, in Bronn, Klassen und Ordnungen Thier-Reichs, vol. 1, 1880, p. 197, pl. 7, fig. 20.—Balkwill and Wright, Proc. Roy. Irish Acad., ser. 2, vol. 3, 1882, p. 547.—Fornasini, Boll. Soc. Geol. Ital., vol. 2, 1883, p. 185, pl. 2, fig. 5.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 456, pl. 56, figs. 21, 22, 24–26, 19?, 20?, 23?, 27?. 28?; Journ. Roy. Micr. Soc., 1887, p. 902.—Wright, Ann. Mag. Nat. Hist., vol. 4, ser. 6. 1889, p. 448.—Pearcey, Trans. Glasgow Nat. Hist. Soc., vol. 2, 1890, p. 177.—Robertson, Proc. Nat. Hist. Soc. Glasgow, pt. 3, 1892. p. 241.—Egger, Abh. kön. bay. Akad. Wiss. München, Cl. II, vol. 18, 1893, p. 330, pl. 10, fig. 12.—Woodward, The Observer, vol. 4, 1893. p. 142.—Goës, Kongl. Svensk. Vet. Akad. Handl., vol. 25, No. 9, 1894, p. 75, pl. 13, fig. 729 (not 728, 730); Bull. Mus. Comp. Zoöl., vol. 29, 1896, p. 52.—Flint, Rep. U. S. Nat. Mus., 1897 (1899), p. 306, pl. 53, fig. 3.—Silvestri, Mem. Pont. Accad. Nuovi Lincei, vol. 17, 1900, p. 245, pl. 6, fig. 42.—Millett, Journ. Roy. Micr. Soc., 1901, p. 491.—Chapman, Trans. N. Zealand Inst., vol. 38, 1905, p. 91.—Balkwill and Millett, Rec. Foram. Galway, 1908, p. 5.—Sidebottom, Mem. Proc. Manchester Lit. Philos. Soc., vol. 54, 1910, p. 16.—Cushman, Bull. 71. U. S. Nat. Mus., pt. 3, 1913, p. 11, pl. 1, fig. 4.—Heron-Allen and Earland, Trans. Zool. Soc. London, vol. 20, 1915, p. 660; ser. 2, vol. 11, 1916, p. 248; Journ. Roy. Micr. Soc., 1916, p. 45.—Cushman, Bull. 100, U. S. Nat. Mus., vol. 4, 1921, p. 175.

Lagena sulcata (Walker and Jacob), var. *distoma-polita* Parker and Jones, Philos. Trans., vol. 155, 1865, p. 357, pl. 18, fig. 8.

Lagena laevis (Montagu), var. *gracillima* Wright, Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 478.

Description.—Test elongate, fusiform, the apertural end tapering into a long cylindrical neck with a phialine lip, the opposite end much elongate, ending in a point, closed; surface smooth; wall translucent.

Length up to 2 mm.

LAGENA GRACILIS Williamson.

Plate 4, figs. 3, 4.

Lagena gracilis WILLIAMSON, Ann. Mag. Nat. Hist., ser. 2, vol. 1, 1848, p. 13, pl. 1, figs. 3, 4.—REUSS, Sitz. Akad. Wiss. Wien, vol. 46, pt. 1, 1862 (1863), p. 331, pl. 4, figs. 58–61; pl. 5, fig. 62.—BALKWILL and WRIGHT, Proc. Roy. Irish Acad., ser. 2, vol. 3, 1882, p. 548.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 464, pl. 58, figs. 2, 3, 7–9, 10 [?], 19, 22, 23, 24 [?].—BALKWILL and WRIGHT, Trans. Roy. Irish Acad., vol. 28, 1885, p. 338.—H. B. BRADY, Jour. Roy. Micr. Soc., 1887, p. 903.—PEARCEY, Trans. Glasgow Nat. Hist. Soc., vol. 2, 1890, p. 177.—WRIGHT, Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 479.—EGGER, Abh. kön. bay. Akad. Wiss. München, Cl. II, vol. 18, 1893, p. 328, pl. 10, figs. 25, 49.—Goës, Kongl. Svensk. Vet. Akad. Handl., vol. 25, No. 9, 1894, p. 77, pl. 13, fig. 738.—CHAPMAN, Proc. Zool. Soc. London, pt. 1, 1895, p. 27.—MORTON, Proc. Portland Soc., vol. 2, 1897, p. 117.—MILLETT, Journ. Roy. Micr. Soc., 1901, p. 482, pl. 8, figs. 12–14.—KIAER, in Duc d'Orleans, Croisière Ocean, Mer du Gronland, 1905 (1907), p. 560.—BALKWILL and MILLETT, Rec. Foram. Galway, 1908, p. 5.—CHAPMAN, Subantarctic Ids. New Zealand, 1909, p. 333; Journ. Linn. Soc. Zool., vol. 30, 1910, p. 409.—SIDEBOTTOM, Mem. Proc. Manchester Lit. Philos. Soc., vol. 54, No. 16, 1910, p. 16.—BAGG, Bull. 513, U. S. Geol. Survey, 1912, p. 47, pl. 14, figs. 7, 8.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 24, pl. 8, figs. 5, 6.—HERON-ALLEN and EARLAND, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 81.—PEARCEY, Trans. Roy. Soc. Edinb., vol. 39, 1914, p. 1017.—CHAPMAN, Biol. Res. *Endeavour*, vol. 3, pt. 1, 1915, p. 21.—HERON-ALLEN and EARLAND, Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 248; Journ. Roy. Micr. Soc., 1916, p. 45.—CUSHMAN, Bull. 100, U. S. Nat. Mus., vol. 4, 1921, p. 181.

Lagena vulgaris WILLIAMSON, var. *gracilis* WILLIAMSON, Rec. Foram. Great Britain, 1858, p. 7, pl. 1, figs. 12, 13.

Description.—Test elongate, fusiform, broadest in the middle, apertural end tapering into a long cylindrical neck with a slightly expanded lip, opposite end pointed; surface ornamented by a few distinct longitudinal costae, 6–12 in number.

Length up to 0.60 mm.

Distribution.—This species, originally described by Williamson, occurs in its typical form at many stations about the British Isles. It is recorded at very many localities elsewhere, but an examination of what few figures are given shows many different forms. I have seen British material from off the southwest of Ireland, and have one specimen from *Albatross* station D2534, in 1,234 fathoms (2,257 meters), off the northeastern coast of the United States, which seems typical.

Lagena gracilis—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
19059	U.S.N.M.	1	D2534....	40 01 00 N.; 67 29 15 W..	1,234	37.8	gy. oz.......	Rare.
......	J.A.C....	1	*Flying Falcon* Log 8.	10 miles off Glencoe, southwest Ireland.	53	....	m., s........	Rare.

LAGENA GRACILLIMA (Seguenza).

Plate 4, fig. 5.

Amphorina gracillima SEGUENZA, Foram. mon. Mioc. Messina, 1862, p. 51, pl. 1, fig. 37.

Lagena gracillima JONES, PARKER, and H. B. BRADY, Pal. Soc. Mon., vol. 19, 1866, p. 45, pl. 1, figs. 36, 37.—H. B. BRADY, Ann. Mag. Nat. Hist., ser. 4, vol. 6, 1870, p. 292, pl. 11, figs. 6 *a–c*.—BÜTSCHLI, in Bronn, Klassen und Ordnungen Thier-Reichs, vol. 1, 1880, p. 197, pl. 7, fig. 20.—BALKWILL and WRIGHT, Proc. Roy. Irish Acad., ser. 2, vol. 3, 1882, p. 547.—FORNASINI, Boll. Soc. Geol. Ital., vol. 2, 1883, p. 185, pl. 2, fig. 5.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 456, pl. 56, figs. 21, 22, 24–26, 19?, 20?, 23?, 27?, 28?; Journ. Roy. Micr. Soc., 1887, p. 902.—WRIGHT, Ann. Mag. Nat. Hist., vol. 4, ser. 6, 1889, p. 448.—PEARCEY, Trans. Glasgow Nat. Hist. Soc., vol. 2, 1890, p. 177.—ROBERTSON, Proc. Nat. Hist. Soc. Glasgow, pt. 3, 1892, p. 241.—EGGER, Abh. kön. bay. Akad. Wiss. München, Cl. II, vol. 18, 1893, p. 330, pl. 10, fig. 12.—WOODWARD, The Observer, vol. 4, 1893, p. 142.—GOËS, Kongl. Svensk. Vet. Akad. Handl., vol. 25, No. 9, 1894, p. 75, pl. 13, fig. 729 (not 728, 730); Bull. Mus. Comp. Zoöl., vol. 29, 1896, p. 52.—FLINT, Rep. U. S. Nat. Mus., 1897 (1899), p. 306, pl. 53, fig. 3.—SILVESTRI, Mem. Pont. Accad. Nuovi Lincei, vol. 17, 1900, p. 245, pl. 6, fig. 42.—MILLETT, Journ. Roy. Micr. Soc., 1901, p. 491.—CHAPMAN, Trans. N. Zealand Inst., vol. 38, 1905, p. 91.—BALKWILL and MILLETT, Rec. Foram. Galway, 1908, p. 5.—SIDEBOTTOM, Mem. Proc. Manchester Lit. Philos. Soc., vol. 54, 1910, p. 16.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 11, pl. 1, fig. 4.—HERON-ALLEN and EARLAND, Trans. Zool. Soc. London, vol. 20, 1915, p. 660; ser. 2, vol. 11, 1916, p. 248; Journ. Roy. Micr. Soc., 1916, p. 45.—CUSHMAN, Bull. 100, U. S. Nat. Mus., vol. 4, 1921, p. 175.

Lagena sulcata (WALKER and JACOB), var. *distoma-polita* PARKER and JONES, Philos. Trans., vol. 155, 1865, p. 357, pl. 18, fig. 8.

Lagena laevis (MONTAGU), var. *gracillima* WRIGHT, Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 478.

Description.—Test elongate, fusiform, the apertural end tapering into a long cylindrical neck with a phialine lip, the opposite end much elongate, ending in a point, closed; surface smooth; wall translucent.

Length up to 2 mm.

Distribution.—I have had a number of specimens in the *Albatross* collection which seem to be referable to this species. They are mostly from the northeastern coast of the United States, with two stations off southern Florida. In the Summary of Results of the *Challenger* Expedition specimens are recorded from several *Challenger* stations in the Atlantic; one of these is off the eastern coast of the United States in the same general region from which the *Albatross* material came. Another is off the West Indies. Two others are in the South Pacific, westward from the mouth of the Rio la Plata. There are numerous records for it off the British Isles. Goës records it from Spitzbergen and also from the Caribbean. There are records for it from the Mediterranean, the Antarctic, the Kerimba Archipelago, off New Zealand, and elsewhere. There seems to be a question as to whether this is really a very widely distributed species or whether, being of a smooth type with very few distinguishing characters, there may be several forms included under this name. In the Gulf of Mexico there is a varietal form which has very numerous very fine costae, which are so fine and close together that it is difficult to make them out except with a considerable magnification. In their general shape they are similar to the smooth forms from the Atlantic coast of the United States.

Lagena gracillima—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
19020	U.S.N.M.	1	D2003....	37 16 30 N.; 74 20 36 W..	641	......	....	Rare.
19021	U.S.N.M.	4	D2078....	41 11 30 N.; 66 12 20 W..	499	40.0	gy. m., s....	Few.
19022	U.S.N.M.	4	D2202....	39 38 00 N.; 71 39 45 W..	515	39.1	gn. m.......	Few.
19023	U.S.N.M.	2	D2205....	39 35 00 N.; 71 18 45 W..	1,073	38.1	gy. oz.......	Rare.
3147	U.S.N.M.	1	D2212....	39 59 30 N.; 70 30 45 W..	428	40.0	gn. m.......	Rare.
19024	U.S.N.M.	1	D2242....	40 15 30 N.; 70 27 00 W..	58	51.4	gn. m.......	Rare.
19025	U.S.N.M.	2	D2247....	40 03 00 N.; 69 57 00 W..	67	52.4	gn.m., bk.sp.	Rare.
19026	U.S.N.M.	1	D2552....	39 47 07 N.; 70 35 00 W..	1,081	38.5	br. m.......	Rare.
19033	U.S.N.M.	1	D2555....	39 53 00 N.; 71 32 00 W..	136	47.7	gn. m., s....	Rare.
19027	U.S.N.M.	1	D2639....	25 04 50 N.; 80 15 10 W..	56	......	co. s.........	Rare.
19028	U.S.N.M.	1	....	Off Key West, Fla.......	78	......	....	Rare.
19029[1]	U.S.N.M.	1	D2394....	28 38 30 N.; 87 02 00 W..	420	41.8	gn. m.......	Rare.
19030[1]	U.S.N.M.	2	D2395....	28 36 15 N.; 86 50 00 W..	347	44.1	gy. m.......	Rare.
19031[1]	U.S.N.M.	1	D2377....	29 07 30 N.; 88 08 00 W..	210	67.0	gy. m.......	Rare.

[1] Variety.

LAGENA HEXAGONA (Williamson).

Plate 4, fig. 6.

Entosolenia squamosa Montagu, var. *hexagona* Williamson, Ann. Mag. Nat. Hist., ser. 2, vol. 1, 1848, p. 20, pl. 2, fig. 23; Rec. Foram. Great Britain, 1858, p. 13, pl. 1, fig. 31.

Lagena hexagona SIDDALL, Cat. Brit. Rec. Foram., 1879, p. 6.—GREEN, Amer. Journ. Micr., vol. 6, 1881, p. 46, pl., fig. 4.—BALKWILL and WRIGHT, Proc. Roy. Irish Acad., ser. 2, vol. 3, 1882, p. 548.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 472, pl. 58, figs. 32, 33.—BALKWILL and WRIGHT, Trans. Roy. Irish Acad., vol. 28, 1885, p. 340.—H. B. BRADY, Journ. Roy. Micr. Soc., 1887, p. 904.—WRIGHT, Ann. Mag. Nat. Hist., vol. 4, ser. 6, 1889, p. 449.—PEARCEY, Trans. Glasgow Nat. Hist. Soc., vol. 2, 1890, p. 177.—WRIGHT, Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 480.—ROBERTSON, Proc. Nat. Hist. Soc. Glasgow, pt. 3, 1892, p. 241.—EGGER, Abh. kön. bay. Akad. Wiss. München, Cl. II, vol. 18, 1893, p. 326, pl. 10, fig. 60.—Goës, Kongl. Svensk. Vet. Akad. Handl., vol. 25, No. 9, 1894, p. 80, pl. 13, fig. 746.—CHAPMAN, Proc. Zool. Soc. London, pt. 1, 1895, p. 28.—WRIGHT, Irish Nat., vol. 9, No. 3, 1900, p. 54.—MILLETT, Journ. Roy. Micr. Soc., 1901, p. 8.—CHAPMAN, Trans. New Zealand Inst., vol. 38, 1905, p. 92.—EARLAND, Journ. Quekett Micr. Club, ser. 2, vol. 9, No. 57, 1905, p. 213.—BALKWILL and MILLETT, Rec. Foram. Galway, 1908, p. 5.—HERON-ALLEN and EARLAND, Journ. Roy. Micr. Soc., 1909, p. 425.—CHAPMAN, Subantarctic Ids. N. Zealand, 1909, p. 334; Journ. Linn. Soc. Zool., vol. 30, 1910, p. 408.—SIDEBOTTOM, Mem. Proc. Manchester Lit. Philos. Soc., vol. 54, No. 16, 1910, p. 17, pl. 2, fig. 3.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 17, pl. 6, figs. 2, 3.—HERON-ALLEN and EARLAND, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 76; Trans. Zool. Soc. London, vol. 20, 1915, p. 656; Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 244; Journ. Roy. Micr. Soc., 1916, p. 44.—MESTAYER, Trans. New Zealand Inst., vol. 48, 1916, p. 129.—CUSHMAN, Proc. U. S. Nat. Mus., vol. 56, 1919, p. 608.

Description.—Test pyriform, base semicircular, apertural end somewhat drawn out, with a short neck; surface ornamented by rather regular hexagonal reticulations, the sides of the hexagons verticals, the angles pointing toward the ends of the test.

Length up to 0.25 mm.

Distribution.—Williamson originally described this species from off the Shetland Islands. As the above references show, it is recorded from many stations about the British Isles and comparatively few elsewhere. The European material that I have seen, especially from off the southwest of Ireland, is very typical and abundant. There are a few specimens from the western Atlantic which I have referred rather questionably to this species. They differ from the typical British form in either their slightly different shape, or in the relative size of the reticulations.

The typical British material, so far as I have seen, is of the type given by Williamson, that is, the pyriform test with a broadly rounded initial end, the short neck, and the deep reticulations with the peculiar arrangement already noted in the description above.

Lagena hexagona—*material examined.*

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°*F.*		
19034	U.S.N.M.	9	D2041....	39 22 50 N.; 68 25 00 W..	1,608	38.0	glob. oz.....	Common.
19035	U.S.N.M.	1	D2055....	42 32 00 N.; 68 17 00 W..	100	....	bu. m., s....	Rare.
19036	U.S.N.M.	6	D2639....	25 04 50 N.; 80 15 10 W..	56	....	co. s..........	Frequent.
19037	U.S.N.M.	4	D2756....	3 22 00 S.; 37 49 00 W...	417	40.5	gy. spk......	Few.
......	J.A.C....	6	*Lord Bandon* Log 28.	Off Baltimore, southwest Ireland.	26	....	....	Frequent.
......	J.A.C....	1	*Lord Bandon* Log 58.	Off Bantry Bay, southwest Ireland.	110	....	....	Rare.
......	J.A.C....	7	*Flying Falcon* Log. 8.	10 miles off Glencoe, southwest Ireland.	53	....	....	Frequent.

LAGENA HISPIDA Reuss.

Plate 4, figs. 7, 8.

"Sphaerulae hispidae" SOLDANI, Testaceographia, vol. 2, 1798, p. 53, pl. 17, figs. V, X.

Lagena hispida REUSS, Zeitschr. deutsch. geol. Ges., vol. 10, 1858, p. 43; Sitz. Akad. Wiss. Wien, vol. 46, pt. 1, 1862 (1863), p. 335, pl. 6, figs. 77–79.—BALKWILL and WRIGHT, Proc. Roy. Irish Acad., ser. 2, vol. 3, 1882, p. 548.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 459, pl. 57, figs. 1–4; pl. 59, figs. 2, 5.—BALKWILL and WRIGHT, Trans. Roy. Irish Acad., vol. 28, 1885, p. 337.—H. B. BRADY, Journ. Roy. Micr. Soc., 1887, p. 902.—WRIGHT, Ann. Mag. Nat. Hist., vol. 4, ser. 6, 1889, p. 448.—PEARCEY, Trans. Glasgow Nat. Hist. Soc., vol. 2, 1890, p. 177.—WRIGHT, Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 478.—ROBERTSON, Proc. Nat. Hist. Soc. Glasgow, pt. 3, 1892, p. 241.—EGGER, Abh. kön. bay. Akad. Wiss. München, Cl. II, vol. 18, 1893, p. 324, pl. 10, fig. 26.—GOËS, Kongl. Svensk. Vet. Akad. Handl., vol. 25, No. 9, 1894, p. 74, pl. 13, figs. 723.—CHAPMAN, Proc. Zool. Soc. London, pt. 1, 1895, p. 27.—FLINT, Rep. U. S. Nat. Mus., 1897 (1899), p. 307, pl. 53, fig. 8.—WRIGHT, Irish Nat., vol. 9, No. 3, 1900, p. 53.—MILLETT, Journ. Roy. Micr. Soc., 1901, p. 6.—CHAPMAN, Trans. New Zealand Inst., vol. 38, 1905, p. 91.—EARLAND, Journ. Quekett Micr. Club, ser. 2, vol. 9, No. 57, 1905, p. 211.—CHAPMAN, Journ. Linn. Soc. Zool., vol. 30, 1910, p. 407.—SIDEBOTTOM, Journ. Quekett Micr. Club, vol. 11, 1912, p. 385, pl. 14, fig. 31; pl. 15, figs. 1, 2.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 13, pl. 4, figs. 4, 5; pl. 5, fig. 1.—HERON-ALLEN and EARLAND, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 74.—PEARCEY, Trans. Roy. Soc. Edinb., vol. 49, 1914, p. 1017.—HERON-ALLEN and EARLAND, Trans. Linn. Soc. London, ser. 2, vol. 11, 1916 p 243, pl. 41, fig. 16.—MESTAYER, Trans. New Zealand Inst., vol. 48, 1916, p. 129.—CUSHMAN, Proc. U. S. Nat. Mus., vol. 56, 1919, p. 608.

Description.—Test globular or pyriform, usually not compressed, neck elongate, thin, slender; wall thin, clothed with delicate spines uniformly distributed over the test.

Length 0.40–0.80 mm.

Distribution.—Spinose specimens of *Lagena* seem to be rare in the western Atlantic.. I have had specimens from but two stations, D2144 in the Caribbean, off Panama, and D2150, in the Caribbean, off Yucatan. Flint records specimens from the northern part of the Gulf of Mexico and in the Caribbean, west of the Leeward Islands. Brady's Atlantic *Challenger* records, except for one off the western coast of Africa, are all within this same faunal region, off the coast of Brazil, off the West Indies, and off Bermuda. There are numerous records for the species about the coast of the British Isles. From the large number of records and the different forms figured it is quite probable that a closer study of the hispid forms of *Lagena* will show definite species or varieties with definite geographical limits.

Lagena hispida—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
19062	U.S.N.M.	1	D2144....	9 49 00 N.; 79 31 30 W..	896	....	gn. m.......	Rare.
19063	U.S.N.M.	1	D2150....	13 34 45 N.; 81 21 10 W..	382	45.8	wh. crs. s....	Rare.

LAGENA IOTA, new species.

Plate 4, figs. 9–11.

Description.—Test somewhat pyriform, about one and one-half times as long as broad, somewhat compressed, base bluntly pointed, apertural end somewhat drawn out, basal portion with an elongate curved thickening at each side of the periphery, not connecting with one another at the base; wall of the test smooth, but the central portion usually clouded with numerous minute thickenings; aperture with a slight entosolenian tube.

Length 0.50 mm.

Distribution.—Type-specimens (U.S.N.M. Cat. No. 19083) from *Albatross* station D2041, in 1,608 fathoms (2,940 meters), off the northeastern coast of the United States. I have failed to find this species elsewhere in the *Albatross* dredgings.

Lagena iota—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
19086	U.S.N.M.	2	D2029....	39 42 00 N.; 70 47 00 W..	1,168	38.5	gy. m.......	Rare.
19087	U.S.N.M.	3	D2035....	39 26 16 N.; 70 02 37 W..	1,362	....	glob. oz.....	Few.
19088	U.S.N.M.	1	D2036....	38 52 40 N.; 69 24 40 W..	1,735	38.0	glob. oz.....	Rare.
19089	U.S.N.M.	2	D2037....	38 53 00 N.; 69 23 30 W..	1,731	38.0	glob. oz.....	Rare.
19083	U.S.N.M.	10+	D2041....	39 22 50 N.; 68 25 00 W..	1,608	38.0	glob. oz.....	Abundant.
19090	U.S.N.M.	2	D2043....	39 49 00 N.; 68 28 30 W..	1,467	38.5	glob. oz.....	Rare.
19091	U.S.N.M.	1	D2097....	37 56 20 N.; 70 57 30 W..	1,917	....	glob. oz.....	Rare.
19092	U.S.N.M.	2	D2105....	37 50 00 N.; 73 03 50 W..	1,395	41.0	glob. oz.....	Rare.
19093	U.S.N.M.	1	D2160....	23 10 31 N.; 82 20 37 W..	167	....	co...........	Rare.
19094	U.S.N.M.	1	D2530....	40 53 30 N.; 66 24 00 W..	956	38.4	gy. oz.......	Rare.
19095	U.S.N.M.	1	D2684....	39 35 00 N.; 70 54 00 W..	1,106	....	br. c., bk. sp.	Rare.
19096	U.S.N.M.	1	D2706....	41 28 30 N.; 65 35 30 W..	1,188	....	gy. oz., for..	Rare.
19097	U.S.N.M.	3	D2713....	38 20 00 N.; 70 08 30 W..	1,859	....	br. c........	Few.

LAGENA LACUNATA Burrows and Holland.

Plate 4, figs. 12, 13.

Heron-Allen and Earland[5] record a few specimens of this species from the west of Scotland.

LAGENA LAEVIGATA (Reuss).

Plate 5, figs. 1, 2.

Fissurina laevigata Reuss, Denkschr. Akad. Wiss. Wien, vol. 1, 1849, p. 366, pl. 46, fig. 1; Sitz. Akad. Wiss. Wien, vol. 46, pt. 1, 1862 (1863), p. 338, pl. 6, fig. 84.—Terquem, Mém. Soc. Géol. France, ser. 3, vol. 2, 1882, p. 30, pl. 1 (9), figs. 17*a*, *b*.

Lagena laevigata Terrigi, Atti Accad. Pont. Nuovi Lincei, vol. 33, 1880, p. 177, pl. 1, fig. 6.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 473, pl. 114, figs. 8*a*, *b*.—Balkwill and Millett, Journ. Micr., vol. 3, 1884, p. 81, pl. 2, fig. 6.—Balkwill and Wright, Trans. Roy. Irish Acad., vol. 28, 1885, p. 340.—H. B. Brady, Journ. Roy. Micr. Soc., 1887, p. 905.—H. B. Brady, Parker, and Jones, Trans. Zool. Soc. London, vol. 12, 1888, p. 222.—Wright, Ann. Mag. Nat. Hist., vol. 4, ser. 6, 1889, p. 449.—Pearcey, Trans. Glasgow Nat. Hist. Soc., vol. 2, 1890, p. 177.—Wright, Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 480.—Robertson, Proc. Nat. Hist. Soc. Glasgow, pt. 3, 1892, p. 241.—Egger, Abh. kön. bay. Akad. Wiss. München, Cl. II, vol. 18, 1893, p. 330, pl. 10, figs. 64, 65.—Chapman, Proc. Zool. Soc. London, pt. 1, 1895, p. 29.—Madsen, Medd. fra Dansk. Geol. Forening, No. 2, 1895, pp. 74, 195, pl., fig. 3.—Wright, Irish Nat., vol. 9, No. 3, 1900, p. 54.—Millett, Journ. Roy. Micr. Soc., 1901, p. 493.—Sidebottom, Mem. Proc. Manchester Lit. Philos. Soc., vol. 50, No. 5, 1906, p. 5, pl. 1, fig. 6 [?].—Balkwill and Millett, Rec. Foram. Galway, 1908, p. 5.—Heron-Allen and Earland, Journ. Roy. Micr. Soc., 1909, p. 425.—Chapman, Journ. Linn. Soc. Zool., vol. 30, 1910, p. 409.—Sidebottom, Mem. Proc. Manchester Lit. Philos. Soc., vol. 54, No. 16, 1910, p. 17.—Chapman, Zool. Res. *Endeavour*, pt. 3, 1912, p. 311.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 7, pl. 2, fig. 1.—Heron-Allen and Earland, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 81.—Chapman, Biol. Res. *Endeavour*, vol. 3, pt. 1, 1915, p. 21.—Pearcey, Trans. Roy. Soc. Edinb., vol. 49, 1914, p. 1018.—Héron-Allen and Earland, Trans. Zool. London, vol. 20, 1915, p. 661; Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 249, pl. 41, figs. 23, 24; Journ. Roy. Micr. Soc., 1916, p. 45.—Cushman, Proc. U. S. Nat. Mus., vol. 56, 1919, p. 607; Bull. 100, U. S. Nat. Mus., vol. 4, 1921, p. 174.

Fissurina globosa Bornemann, Zeitschr. deutsch. geol. Ges., vol. 7, 1885, p. 317, pl. 12, fig. 4.

Lagena marginata Haeusler, Neues Jahrb. für. Min., 1887, pt. 1, p. 186, pl. 4, figs. 51, 52 (not *Vermiculum marginatum* Montagu).

Description.—Test subglobose, compressed, somewhat pyriform in front view, in cross section elliptical; wall smooth, transparent in thin specimens or opaque in more thickened ones, along the lateral margins usually clear even in thickened specimens; aperture elongate, fairly narrow, connecting with the interior by a fairly long entosolenian neck.

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[5] Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 254, pl. 51, figs. 28, 29.

Length up to 1 mm.; breadth slightly less.

Distribution.—It is strange that this species which is apparently so common in many parts of the world has not occurred in its typical form in the western Atlantic collections. It seems to be abundant about the British Isles.

LAGENA LAEVIS (Montagu).

Plate 5, fig. 3.

There are very numerous records for this species, covering most of the areas from which foraminifera have been recorded, but a reference to the various forms figured will show that many different smooth forms have been included under this name. Such specimens are not recorded in the *Albatross* collections, although there are numerous smooth forms which might well fit some of the figures given for this species.

LAGENA LAEVIS (Montagu), var. NEBULOSA, new variety.

Plate 5, figs. 4, 5.

Lagena laevis H. B. BRADY (part) (not Montagu), Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 455, pl. 56, figs. 10–12, 13 [?], 14 [?].

Description.—Variety differing from the typical in the form of the test which is globular or somewhat cylindrical, the neck slender, test with the sides parallel, the surface of the test with numerous thickenings giving a clouded appearance, almost subspinose.

Length up to 0.80 mm.

Distribution.—Type-specimen (U.S.N.M. Cat. No. 19076) from *Albatross* station D2144, in 896 fathoms (1,639 meters), in the Caribbean. Specimens which may be referred to this variety occur at two different localities in the *Albatross* dredgings. There are three stations in the Caribbean, the remainder off the northeastern coast of the United States. Brady records *Lagena laevis* in this same general area from off the coast of Brazil, off the Virgin Islands, off Bermuda, and off the eastern coast of the United States. An examination of some of the originals of these records may show that they belong to this variety.

Lagena laevis, var. nebulosa—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
19072	U.S.N.M.	2	D2041....	39 22 50 N.; 68 25 00 W..	1,608	38.0	glob. oz......	Rare.
19073	U.S.N.M.	1	D2043....	39 49 00 N.; 68 28 30 W..	1,467	38.5	glob. oz......	Rare.
19074	U.S.N.M.	1	D2063....	42 23 00 N.; 66 23 00 W..	141	46.0	s., crs. g.....	Rare.
19075	U.S.N.M.	1	D2117....	15 24 20 N.; 63 31 30 W..	683	39.8	yl. m., fne. s.	Rare.
19076	U.S.N.M.	1	D2144....	9 49 00 N.; 79 31 30 W..	896	....	gn. m.......	Rare.
19077	U.S.N.M.	3	D2150....	13 34 45 N.; 81 21 10 W..	382	45.8	wh. crs. s....	Few.
19078	U.S.N.M.	1	D2205....	39 35 00 N.; 71 18 45 W..	1,073	38.1	gy. oz.......	Rare.
19079	U.S.N.M.	1	D2247....	40 03 00 N.; 69 57 00 W..	67	52.4	gn. m., bk. s.	Rare.
19080	U.S.N.M.	1	D2563....	39 18 30 N.; 71 23 30 W..	1,422	37.4	gy. oz.......	Rare.
19081	U.S.N.M.	1	D2684....	39 35 00 N.; 70 54 00 W..	1,106	....	br.c.,bk.sp..	Rare.
19082	U.S.N.M.	1	D2713....	38 20 00 N.; 70 08 30 W..	1,859	....	br. oz........	Rare.

LAGENA LAGENOIDES (Williamson).

Plate 5, figs. 6–8.

Entosolenia marginata Walker and Boys, var. *lagenoides* Williamson, Rec. Foram. Great Britain, 1858, p. 11, pl. 1, figs. 25, 26.

Lagena lagenoides Reuss, Sitz. Akad. Wiss. Wien, vol. 46, pt. 1, 1862 (1863), p. 324, pl. 2, figs. 27, 28.—Balkwill and Wright, Proc. Roy. Irish Acad., ser. 2, vol. 3, 1882, p. 548.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 479, pl. 60, figs. 6, 8, 9, 12.—Balkwill and Wright, Trans. Roy. Irish Acad., vol. 28, 1885, p. 341, pl. 12, figs. 22.—H. B. Brady, Journ. Roy. Micr. Soc., 1887, p. 906.—H. B. Brady, Parker, and Jones, Trans. Zool. Soc. London, vol. 12, 1888, p. 223, pl. 44, fig. 23.—Wright, Ann. Mag. Nat. Hist., vol. 4, ser. 6, 1889, p. 448.—Pearcey, Trans. Glasgow Nat. Hist. Soc., vol. 2, 1890, p. 177.—Wright, Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 481.—Balkwill and Millett, Rec. Foram. Galway, 1908, p. 6.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 39, pl. 16, fig. 2.—Heron-Allen and Earland, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 88; Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 252; Journ. Roy. Micr. Soc., 1916, p. 46.—Cushman, Bull. 100, U. S. Nat. Mus., vol. 4, 1921, p. 183.

Description.—Test flask-shaped, usually compressed, body oval or ovate, surrounded by a simple peripheral keel which has numerous radiating tubulations, neck usually comparatively short, in complete specimens usually joined with the peripheral keel.

Length 0.4–1 mm.

Distribution.—Williamson originally described this as a variety of *Lagena marginata*. It has been recorded by numerous authors from about the British Isles, as the above list of references will show. The only station from which I have had specimens in the *Albatross* collections which might be referred to this species is D2150, in the Caribbean Sea. Specimens were few, but radiating tubulations were much fewer than in *Lagena sublagenoides* Cushman. There are numerous other records for this species in different parts of the oceans, but they are not always figured and described in detail, and it is probable that there are more than one species or variety involved.

Lagena lagenoides—material examined.

Cat. No.	Coll. of—	Number of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
19112	U.S.N.M.	2	D2150....	° ′ ″ ° ′ ″ 13 34 45 N.; 81 21 10 W..	382	°F. 45.8	wh. crs., s...	Rare.

LAGENA LAGENOIDES (Williamson), var. TENUISTRIATA H. B. Brady.

Plate 5, fig. 9.

Lagena tubulifera H. B. Brady, var. *tenuistriata* H. B. Brady, Quart. Journ. Micr. Sci., vol, 21, 1881, p. 61.

Lagena lagenoides Williamson, var. *tenuistriata* H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 479, pl. 60, fig. 11 (not 15, 16); Journ. Roy. Micr. Soc., 1887, p. 907.—Wright, Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 481.—Egger, Abh. kön. bay. Akad. Wiss. München, Cl. II, vol. 18, 1893, p. 336, pl. 10, figs. 94, 95.—Millett, Journ. Roy. Micr. Soc., 1901, p. 264.—Sidebottom, Mem. Proc. Manchester Lit. Philos. Soc., vol. 50, No. 5, 1906, p. 12, pl. 2, figs. 9, 10.—Balkwill and Millett, Rec. Foram. Galway, 1908, p. 6.—Sidebottom, Mem. Proc. Manchester Lit. Philos. Soc., vol. 54, No. 16, 1910, p. 19; Journ. Quekett Micr. Club, vol. 11, 1912, p. 413, pl. 19, figs. 4, 5.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 39, pl. 16, fig. 3.—Heron-Allen and Earland, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 88, pl. 7, fig. 7.—Pearcey, Trans. Roy. Soc. Edinb., vol. 49, 1914, p. 1019.—Heron-Allen and Earland, Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 252; Journ. Roy. Micr. Soc., 1916, p. 46.

Description.—Test flask-shaped, pyriform, keel with comparatively few, large, remote tubulations, body of test not greatly compressed; surface ornamented with coarse longitudinal costae running the length of the body of the test.

Length 0.35–0.50 mm.

Distribution.—Most of the records for this variety are from the region of the British Isles and the Mediterranean. Although specimens referred to the typical form of the species have occurred in the *Albatross* dredgings, none of them showed the striations characteristic of this variety.

LAGENA LINEATA (Williamson).

Plate 5, fig. 10; pl. 6, figs. 5–8.

Entosolenia lineata Williamson, Ann. Mag. Nat. Hist., ser. 2, vol. 1, 1848, p. 18, pl. 2, fig. 18.

Entosolenia globosa (Montagu), var. *lineata* Williamson, Rec. Foram. Great Britain, 1858, p. 9, pl. 1, fig. 17.

Lagena lineata Reuss, Sitz. Akad. Wiss. Wien, vol. 46, pt. 1, 1862 (1863), p. 328, pl. 4, fig. 48.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 461, pl. 57, fig. 13.—Balkwill and Wright, Trans. Roy. Irish Acad., vol. 28, 1885, p. 336, pl. 14, figs. 13–16.—H. B. Brady, Journ. Roy.

Micr. Soc., 1887, p. 902.—H. B. BRADY, PARKER, and JONES, Trans. Zool. Soc. London, vol. 12, 1888, p. 222, pl. 44, fig. 33.—PEARCEY, Trans. Glasgow Nat. Hist. Soc., vol. 2, 1890, p. 177.—EGGER, Abh. kön. bay. Akad. Wiss. München, Cl. II, vol. 18, 1893, p. 326, pl. 10, figs. 29, 30.—MORTON, Proc. Portland Soc., 1897, p. 118.—WRIGHT, Irish Nat., vol. 9, No. 3, 1900, p. 54.—MILLETT, Journ. Roy. Micr. Soc., 1901, p. 7.—EARLAND, Journ. Quekett Micr. Club, ser. 2, vol. 9, No. 57, 1905, p. 210.—SIDEBOTTOM, Mem. Proc. Manchester Lit. Philos. Soc., vol. 50, No. 5, 1906, p. 4.—BALKWILL and MILLETT, Rec. Foram. Galway, 1908, p. 5.—CHAPMAN, Subantarctic Ids. New Zealand, 1909, p. 334, pl. 15, fig. 3.—SIDEBOTTOM, Mem. Proc. Manchester Lit. Philos. Soc., vol. 54, No. 16, 1910, p. 15.—HERON-ALLEN and EARLAND, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 75.—PEARCEY, Trans. Roy. Soc. Edinb., vol. 49, 1914, p. 1017.—HERON-ALLEN and EARLAND, Trans. Zool. Soc. London, vol. 20, 1915, p. 656; Journ. Linn. Soc., Zool., ser. 2, vol. 11, 1916, p. 243; Journ. Roy. Micr. Soc., 1916, p. 44.

Description.—Test subglobular, or slightly pyriform, broadest toward the base, apertural end truncate, with an entosolenian neck, base often with a short projection; surface with very fine longitudinal markings, often indistinct; surface dull.

Length up to 0.25 mm.

Distribution.—This species, originally described by Williamson, occurs at a large number of stations off the British Isles. The figures of specimens from other regions seem to show that they are not identical with the British specimens. I have failed to find any typical specimens except in the British material that I have had. This is from off Baltimore, southwest of Ireland, in 26 fathoms (48 meters).

LAGENA LONGISPINA (H. B. Brady).

Plate 5, figs. 11, 12.

Lagena longispina H. B. BRADY, Quart. Journ. Micr. Sci., vol. 21, 1881, p. 61; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 454, pl. 56, figs. 33–36; pl. 59, figs. 13, 14.—FLINT, Rep. U. S. Nat. Mus., 1897 (1899), p. 306, pl. 53, fig. 2.—CHAPMAN, Journ. Linn. Soc. Zool., vol. 30, 1910, p. 407.—PEARCEY, Trans. Roy. Soc. Edinb., vol. 49, 1914, p. 1016.

Description.—Test subglobular, or somewhat compressed; wall fairly thick; surface smooth, basal portion furnished with two or more long spines.

Length without the spines up to nearly 1 mm.; spines often longer than the length of the test.

Distribution.—Brady figures several forms under this specific name, all of which are marked by elongate spines from the basal portion of the test. Flint's figures from the *Albatross* collections show specimens very much like those I have figured here. So far as I have seen in the *Albatross* material from the western Atlantic, the specimens typically have two very long divergent spines, their centers hollow. Egger gives figures of this species but they are not at all characteristic if they can be considered specifically identical with this species. It has not been recorded in all the work from about the British Isles and is evidently a species of comparatively deep water. It was found at a number of stations south of the latitude of New York, off the northeastern coast of the United States, one station in the northern part of the Gulf of Mexico, and one east of Trinidad. Flint's specimens were from the Gulf of Mexico and the Caribbean. Brady's stations are well scattered in the deeper water of various parts of the Atlantic and elsewhere.

Lagena longispina—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
18995	U.S.N.M.	1	D2037....	38 53 00 N.; 69 23 30 W..	1,731	38.0	glob. oz......	Rare.
18996	U.S.N.M.	1	D2038....	38 30 30 N.; 69 08 25 W..	2,033	....	glob. oz......	Rare.
18997	U.S.N.M.	1	D2039....	39 19 26 N.; 68 20 20 W..	2,369	....	glob. oz......	Rare.
18998	U.S.N.M.	1	D2041....	39 22 50 N.; 68 25 00 W..	1,608	38.0	glob. oz......	Rare.
18999	U.S.N.M.	1	D2097....	37 56 20 N.; 70 57 30 W..	1,917	....	glob. oz......	Rare.
19000	U.S.N.M.	1	D2226....	37 00 00 N.; 71 54 00 W..	2,045	36.8	glob. oz......	Rare.
19001	U.S.N.M.	2	D2394....	28 38 30 N.; 87 02 00 W..	420	41.8	gn. m.......	Rare.
19002	U.S.N.M.	1	D2754....	11 40 00 N.; 58 33 00 W..	880	38.0	glob. oz......	Rare.

LAGENA LUCIDA (Williamson).

Plate 6. figs. 1, 2.

Entosolenia marginata MONTAGU, var. *lucida* WILLIAMSON, Ann. Mag. Nat. Hist., ser. 2, vol. 1, 1848, p. 17, pl. 2, fig. 17.

Lagena lucida REUSS, Sitz. Akad. Wiss. Wien, vol. 46, pt. 1, 1862 (1863), p. 324, pl. 2, figs. 25, 26.—BALKWILL and WRIGHT, Proc. Roy. Irish Acad., ser. 2, vol. 3, 1882, p. 548.—BALKWILL and MILLETT, Journ. Micr., vol. 3, 1884, p. 80, pl. 2, figs 25, 26.—H. B. BRADY, Journ. Roy. Micr. Soc., 1887, p. 905.—ROBERTSON, Proc. Nat. Hist. Soc. Glasgow, pt. 3, 1892, p. 241.—WRIGHT, Irish Nat., vol. 9, No. 3, 1900, p. 54.—EARLAND, Journ. Quekett Micr. Club, ser. 2, vol. 9, No. 57, 1905, p. 213.—SIDEBOTTOM, Mem. Proc. Manchester Lit. Philos. Soc., vol. 50, No. 5, 1906, p. 6, pl. 1, figs. 9–12.—BALKWILL and MILLETT, Rec. Foram. Galway, 1908, p. 5.—HERON-ALLEN and EARLAND, Journ. Roy. Micr. Soc., 1909, p. 425.—SIDEBOTTOM, Mem. Proc. Manchester Lit. Philos. Soc., vol. 54, No. 16, 1910, p. 17, pl. 2, fig. 7; Journ. Quekett Micr. Club, vol. 11, 1912, p. 401, pl. 17, fig. 13 (12? 14?).—HERON-ALLEN and EARLAND, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 87; Trans. Linn. Soc. London, ser 2, vol. 11, 1916, p. 249; Journ. Roy. Micr. Soc., 1916, p. 46.

Description.—Test somewhat compressed, marginal portion and central area clear and translucent, with a rather broad more or less opaque band between; wall smooth; aperture usually fissurine or rounded.

Length 0.30–0.50 mm.

Distribution.—Williamson's original figure of this species shows a typical British specimen. In this same form the species is common about the British Isles but seems to be lacking on the western side of the Atlantic. There are a few references for it from other regions, but for the most part the figures are not typical. I have had it from several European stations.

Lagena lucida—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
						°F.		
......	J.A.C....	1	*Flying Falcon* Log 8.	10 miles off Glencoe, southwest Ireland.	53	....	m., s........	Rare.
......	J.A.C....	1	*Lord Bandon* Log 28.	Off Baltimore, southwest Ireland.	26	....	....	Rare.
......	J.A.C....	1	*Lord Bandon* Log 58.	Off Bantry Bay, southwest Ireland.	110	....	....	Rare.
......	J.A.C....	1	....	Dog's Bay, Ireland......	....	....	....	Rare.

LAGENA LYELLII (Seguenza).

Plate 6, fig. 3.

Amphorina lyellii Seguenza, Foram. mon. mioc. Messina, 1862, p. 52, pl. 1, fig. 40.

Lagena lyellii H. B. Brady, Ann. Mag. Nat. Hist., ser. 4, vol. 6, 1870, p. 292, pl. 11, fig. 7.—Balkwill and Wright, Proc. Roy. Irish Acad., ser. 2, vol. 3, 1882, p. 547.—Balkwill and Millett, Journ. Micr., vol. 3, 1884, p. 27, pl. 2, fig. 2; Rec. Foram. Galway, 1908, p. 5.—Sidebottom, Mem. Proc. Manchester Lit. Philos. Soc., vol. 54, No. 16, 1910, p. 15, pl. 1, figs. 13–15, 17, 18?.—Heron-Allen and Earland, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 79, pl. 6, fig. 8; Trans. Zool. Soc. London, vol. 20, 1915, p. 659; Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 247; Journ. Roy. Micr. Soc., 1916, p. 45.

Nearly all the records for this species are from the coasts of the British Isles and the Mediterranean, although Heron-Allen and Earland record it from the Kerimba Archipelago. It has not occurred on the western side of the Atlantic.

LAGENA MALCOMSONII Wright.

Plate 6, fig. 4.

Lagena laevigata (Reuss), var. *malcomsonii* Wright, Proc. Belfast Nat. Field Club, ser. 2, vol. 3, 1910–1911, App., p. 4, pl. 1, figs. 1, 2.

Lagena malcomsonii Heron-Allen and Earland, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 84, pl. 6, fig. 9; Trans. Zool. Soc. London, vol. 20, 1915, p. 662; Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 251; Journ. Roy. Micr. Soc., 1916, p. 46.

Heron-Allen and Earland give the following notes on this species from the Clare Island Survey Report:

> A few specimens sparingly distributed over 11 stations. Wright's species is merely *L. quadrata* (Williamson) in which the marginal edges are rounded

instead of acute, and the aperture is surrounded by a produced lip. Specimens vary accordingly within all the limits usually found in *L. quadrata*. Wright's figures represent a somewhat long shell with practically parallel sides. The range in shape among the Clare Island specimens extends from almost square tests to the outline of Wright's figure, but we have met with specimens in *Goldseeker* dredgings in which the shell is very much longer and narrower, resembling, in fact, a piece of compressed tubing.

They also record it from the west of Scotland and off South Cornwall. It seems to be rare. I have had no specimens from the western Atlantic.

LAGENA MARGINATA (Walker and Boys).

Plate 6, fig. 9.

There are many references to this species in the literature, but if they are examined it will be found that they vary greatly in their characters. The main characteristic seems to be the development of a keel of greater or less extent about a usually subspherical central chamber. If, however, the original figures of Walker and Boys are consulted, it will be found that their figures show a more or less compressed pyriform test, gradually tapering from the somewhat curved apertural end, with a very broad rounded basal portion, and instead of having a thin broad keel, have a rounded narrow marginal carina. Such specimens as this are common about the British Isles and should be taken as the typical form of this widely recorded species. I have not found typical material on the western side of the Atlantic. As there are so many forms quoted under this species, an examination of much of the material which has passed under this name should be made and the various forms discriminated.

LAGENA MARGINATA (Walker and Boys), var. INAEQUILATERALIS J. Wright.

Lagena marginata (WALKER and BOYS), var. *inaequilateralis* WRIGHT, Rep. Belfast Nat. Field Club, 1885–1886, App., p. 321, pl. 26, fig. 10; Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 481.—SIDEBOTTOM, Mem. Proc. Manchester Lit. Philos. Soc., vol. 50, No. 5, 1906, p. 10, pl. 2, fig. 6; vol. 54, No. 16, 1910, p. 18.—HERON-ALLEN and EARLAND, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 85; Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 251; Journ. Roy. Micr. Soc., 1916, p. 46.

Heron-Allen and Earland make the following notes on this variety:

"An occasional specimen found at 6 different stations. Only a few present the characteristics of Wright's variety in a strongly marked manner. When typical this is one of the most distinctive and interesting varieties we know. The highly convex surface on one side of the shell, strongly contrasted with the flat surface on the other, and the curious aperture situated under a little hood on one side—

always the flat side of the test—are features not to be overlooked. The shape of the hood varies considerably and in some cases almost attains the trumpet-like character of the aperture of *L. Millettii*, but, of course, on a very much smaller scale."

They also record it from the west of Scotland and off South Cornwall, rare in both cases. Wright recorded it from off the southwestern coast of Ireland.

LAGENA MARGINATA (Walker and Boys), var. SEMICARINATA Sidebottom.

Plate 6, fig. 13.

Lagena marginata (Walker and Boys), var. *semicarinata* Sidebottom, Mem. Proc. Manchester Lit. Philos. Soc., vol. 50, No. 5, 1906, p. 10, pl. 2, fig. 7.—Heron-Allen and Earland, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 85, pl. 7, fig. 4.

The only Atlantic record seems to be that of Heron-Allen and Earland, from whom the figure is copied as well as the following notes:

"We have one specimen from Station 13 which we are inclined to attribute to Mr. Sidebottom's variety in spite of certain essential differences. In the text of his paper he described the variety under the name of *L. inaequilateralis* Wright var. *semi-marginata* (nov.), no doubt overlooking the fact that his varietal name had already been appropriated by Reuss. In the plate, however, this specimen is described as var. *semi-carinata*. Mr. Sidebottom's specimen is described as 'an interesting variation of *L. marginata* var. *inaequilateralis* Wright. The mouth is the same as in Mr. Wright's form, and the test is also inequilateral. The keel, however, is confined to the aboral end of the test and is well developed.'

"Our specimen differs, inasmuch as the aperture is fissurine, and the shell is of the normal equally biconvex type, with an attached entosolenian tube. The marginal keel, however, exactly resembles Mr. Sidebottom's figure in position and extent."

LAGENA MARGINATA (Walker and Boys), var. SEMIMARGINATA Reuss.

Plate 6, figs. 14, 15.

The only Atlantic records for this species are given by Brady,[6] off Prince Edwards Island, 50–150 fathoms (91–274 meters), off Heard Island, 75 fathoms (137 meters), and three stations in the middle of the South Atlantic, 1,900, 2,200 and 2,350 fathoms (3,475, 4,024, and 4,298 meters). Heron-Allen and Earland[7] record a single specimen from the west of Scotland.

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[6] Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 477, pl. 59. figs. 17, 19.

[7] Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 251.

LAGENA MARGINATA (Walker and Boys), variety.

Plate 8, fig. 1.

Description.—Variety differing from the typical in the very slight thin keel extending entirely about the test, the aperture very elongate, elliptical.

Diameter up to 1 mm. or slightly more.

Distribution.—In the Gulf of Mexico and the Caribbean there is a large form with a very broad thin transparent keel which may possibly be a variety of *Lagena marginata*, but further study may show it to be a distinct species.

Lagena marginata, var.—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
19116	U.S.N.M.	2	D2117....	15 24 20 N.; 63 31 30 W..	683	39.8	yl. m., fne. s.	Rare.
19117	U.S.N.M.	1	D2144....	9 49 00 N.; 79 31 30 W..	896	....	gn. m.......	Rare.
19118	U.S.N.M.	1	D2150....	13 34 45 N.; 81 21 10 W..	382	45.8	wh. crs. s....	Rare.
19119	U.S.N.M.	1	D2383 ...	28 32 00 N.; 88 06 00 W..	1,181	39.6	br. gn. m...	Rare.
19120	U.S.N.M.	1	D2385 ...	28 51 00 N.; 88 18 00 W..	730	40.1	gy. m......	Rare.
19121	U.S.N.M.	1	D2393....	28 43 00 N.; 87 14 30 W..	525	41.1	lt. gy. m...	Rare.
19122	U.S.N.M.	3	D2394....	28 38 30 N.; 87 02 00 W..	420	41.8	gn. m......	Few.

LAGENA MARGINATO-PERFORATA Seguenza.

Plate 7, fig. 4.

Lagena marginato-perforata SEGUENZA, Atti Accad. Lincei, ser. 3, vol. 6, 1880, p. 332, pl. 17, fig. 34.—SIDEBOTTOM, Mem. Proc. Manchester Lit. Philos. Soc., vol. 50, No. 5, 1906, p. 10, pl. 2, fig. 5; vol. 54, No. 16, 1910, p. 18.—HERON-ALLEN and EARLAND, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 86, pl. 7, figs. 5, 6; Trans. Zool. Soc. London, vol. 20, 1915, p. 663; Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 252; Journ. Roy. Micr. Soc., 1916, p. 46.

"This species occurs at 9 stations among the dredgings and is quite common in the fine mud of Station 13. There is considerable variety in the specimens, some having a single keel, the true *L. marginato-perforata*, others a double keel (= *Fissurina punctata* (Seguenza)); while many of the specimens are ornamented with a varying number of minute radiating costae at the two extremities of the shell, which, however, are not produced over the central area of the test. There is usually an attached entosolenian tube, and the coarse perforations from which the species takes its name are generally suppressed in the area of the shell where the tube is attached. This agrees with Mr. Sidebottom's specimen and drawing; but in his specimens the internal tube is described as being straight and free. The species is of fairly common occurrence in shallow-water tropical gatherings. Mr. Wright has recently described and figured it under the name *L. laevigata* var. *marginato-perforata*, as a fossil from the Estuarine Clays of Magheramorne, 'very common,' recent Irish specimens 'very few.'"

The above notes are from Heron-Allen and Earland on their specimens from the Clare Island region. They also record it from the west of Scotland and off South Cornwall, but rare. I have found no specimens that I could refer to it in the western Atlantic material.

LAGENA MELO (D'Orbigny).

Oolina melo d'Orbigny, Voy. Amér. Mérid., vol. 5, pt. 5, "Foraminifères," 1839, p. 20, pl. 5, fig. 9.

Lagena melo Jones, Parker, and H. B. Brady, Pal. Soc., vol. 19, 1866, p. 38, pl. 1, fig. 35.—Balkwill and Wright, Trans. Roy. Irish Acad., vol. 28, 1885, p. 340.—H. B. Brady, Journ. Roy. Micr. Soc., 1887, p. 904.—H. B. Brady, Parker, and Jones, Trans. Zool. Soc. London, vol. 12, 1888, p. 222, pl. 44, figs. 21, 24, 25?.—Pearcey, Trans. Glasgow Nat. Hist. Soc., vol. 2, 1890, p. 177.—Woodward, The Observer, vol. 4, 1893, p. 143.—Millett, Journ. Roy. Micr. Soc., 1901, p. 8.—Whiteaves, Geol. Survey Canada, 1901, p. 10.—Sidebottom, Mem. Proc. Manchester Lit. Philos. Soc., vol. 54, no. 16, 1910, p. 17.

Description.—Test subglobular or slightly pyriform, the basal end broadly rounded, the apertural end slightly tapering, the ornamentation consisting of numerous raised costae, the concave surfaces between with numerous transverse ridges dividing the area into rectangular divisions.

Length up to 0.25 mm.

Distribution.—Specimens which can be referred to this species were obtained at a few *Albatross* stations. There are a few records for it from the western Atlantic, those of Brady, Parker, and Jones from off the Abrohlos Bank, and it has been recorded from the Gulf of St. Lawrence, Gaspé Bay, and off Labrador, and off the banks of Newfoundland. There are a few records for it about the British Isles, but it seems to be less common there than are the other reticulately ornamented forms. The *Albatross* specimens are from the northeastern coast of the United States, with one station off Cape Hatteras and one off the southern part of Florida.

Lagena melo—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
19038	U.S.N.M.	2	D2043	39 49 00 N.; 68 28 30 W.	1,467	38.5	glob. oz.	Rare.
19039	U.S.N.M.	1	D2262	39 54 45 N.; 69 29 45 W.	250	41.6	gn. m. s.	Rare.
19040	U.S.N.M.	3	D2014	34 09 00 N.; 76 02 00 W.	168		gy. s.	Few.
19041	U.S.N.M.	1	D2639	25 04 50 N.; 80 15 10 W.	56		co. s.	Rare.
	J.A.C.	1	*Lord Bandon* Log 28.	Off Baltimore, southwest Ireland	26			Rare.

LAGENA MONTAGUI (Alcock).

Plate 7, figs. 1–3; pl. 8, fig. 7.

Entosolenia montagui ALCOCK, Proc. Lit. Philos. Soc. Manchester, vol. 4, 1865, p. 206.

Lagena squamosa MONTAGU, var. *montagui* WRIGHT, Irish Nat., vol. 9, 1900, p. 54, pl. 2, fig. 2.—HERON-ALLEN and EARLAND, Journ. Roy. Micr. Soc., 1911, p. 321, pl. 10, figs. 14–16; Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 76, pl. 7, figs. 11, 12.

This variety or species is known from about the region of the British Isles. The following notes are from Heron-Allen and Earland on their Clare Island specimens, which are here figured.

"An occasional specimen at six stations, varying as usual considerably in size and contour.

"The exact nature of this curious variety is extremely doubtful. In the ordinary course such distorted specimens would be regarded as 'sports' and set aside; but the general uniformity of their nature, and their wide distribution, coupled with the fact that no other species of *Lagena* presents similar characteristics, make it certain that some zoological significance is attachable to their occurrence. Possibly they represent some stage in the life-history of the species with which we are at present unfamiliar.

"We have no data to add to the information already furnished by Mr. Wright. The most characteristic Clare Island specimens correspond exactly with Alcock's original description of the compressed form 'resembling a dried fig.'"

LAGENA MILLETTII Chaster.

Plate 7, fig. 5.

Lagena millettii CHASTER, First Rep. Southport Soc. Nat. Sci., 1890–1891 (1892), p. 61, pl. 1, fig. 10.—BALKWILL and MILLETT, Rec. Foram. Galway, 1908, p. 5.—HERON-ALLEN and EARLAND, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 83, pl. 6, fig. 10.—PEARCEY, Trans. Roy. Soc. Edinb., vol. 49, 1914, p. 1018.—HERON-ALLEN and EARLAND, Journ. Roy. Micr. Soc., 1916, p. 45.

Specimens of this species seem to be rare about the British Isles. They are recorded by Pearcey from the South Atlantic in deep water. It apparently does not occur in the western Atlantic.

LAGENA ORBIGNYANA (Seguenza).

Entosolenia marginata WILLIAMSON (part) (not *Lagena marginata* (Walker and Boys)), Rec. Foram. Great Britain, 1858, p. 9, pl. 1, figs. 19, 20.

Fissurina orbignyana SEGUENZA, Foram. mon. mioc. Messina, 1862, p. 66, pl. 2, figs. 24, 26.

LAGENA ORBIGNYANA (Seguenza), var. CLATHRATA H. B. Brady?

Plate 8, fig. 5.

There are records for this form from the Atlantic about the British Isles as follows: Balkwill and Millett;[8] H. B. Brady;[9] Wright;[10] Balkwill and Millett;[11] and Heron-Allen and Earland.[12] The British specimens do not seem to be typical of the form described by Brady, whose typical specimens were from the Indo-Pacific. In the *Challenger* report Brady mentions the fact that the British specimens are not identical in all their characters with his specimens from the Pacific.

LAGENA ORBIGNYANA (Seguenza), var. ELLIPTICA, new variety.

Plate 6, figs. 10–12.

Description.—Variety differing from the typical in the elongate pyriform shape, the central body portion of the test being elliptical, peripheral, and lateral keels sharp, thin, translucent, body of the test transparent, thin, made slightly granular by the punctae, the area between the keels and bordering the inner margin on the secondary keel usually opaque.

Length up to 0.60 mm.

Distribution.—Type-specimen (U.S.N.M. Cat. No. 19105) from *Albatross* station D2150, in 382 fathoms (697 meters), in the Caribbean. This somewhat resembles Brady's figure.[13]

Lagena orbignyana, var. elliptica—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
19104	U.S.N.M.	2	D2117....	15 24 20 N.; 63 31 30 W..	683	39.8	yl.m., fne. s.	Rare.
19105	U.S.N.M.	3	D2150....	13 34 45 N.; 81 21 10 W..	382	45.8	wh. crs. s....	Few.

LAGENA ORBIGNYANA (Seguenza), var. VARIABILIS Wright.

Plate 8, fig. 2.

Lagena orbignyana (SEGUENZA), var. *variabilis* WRIGHT, Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 482, pl. 20, figs. 9, 9*b*.

Description.—Variety differing from the typical in having the basal portion of the body of the test with numerous longitudinal costae which only occur on the lower third.

Length 0.40–0.60 mm.

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[8] Journ. Micr., vol. 3, 1884, p. 82, pl. 2, fig. 14; pl. 4, fig. 3.

[9] Journ. Roy. Micr. Soc., 1887, p. 906.

[10] Irish Nat., vol. 9, no. 3, 1900, p. 54.

[11] Rec. Foram. Galway, 1908, p. 6.

[12] Proc. Roy, Irish Acad., vol. 31, pt. 64, 1913; p. 90, pl. 7, fig. 10; Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 254.

[13] Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, pl. 59, fig. 26.

Distribution.—Wright described this variety from off the southwest of Ireland in 750 fathoms (1,370 meters). I have a specimen from *Albatross* station D2097, off the northeastern coast of the United States, which is similar to that described by Wright, but it is evidently very rare, as it has not occurred at any of the other *Albatross* stations, so far as I have seen.

Lagena orbignyana, var. variabilis—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
19103	U.S.N.M.	1	D2097....	37 56 20 N.; 70 57 30 W..	1,917	....	glob. oz.....	Rare.

LAGENA ORBIGNYANA (Seguenza), var. WALLERIANA Wright.

Lagena orbignyana (SEGUENZA), var. *walleriana* WRIGHT, Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 481, pl. 20, figs. 8, 8*b*.—HERON-ALLEN and EARLAND, Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 253.

Description.—Variety differing from the typical in having the center of the convex face ornamented with a rounded boss-like protuberance.

Distribution.—This was described by Wright from specimens from off the southwest of Ireland in 53 and 145 fathoms (97 and 265 meters). Heron-Allen and Earland record a single typical specimen from the west of Scotland, and there are a few records for it outside the Atlantic. I have failed to find any specimens in the western Atlantic referable to this variety.

LAGENA ORBIGNYANA (Seguenza), variety.

Plate 8, fig. 8.

There are a very few specimens, similar to that figured, which seem to belong to *L. orbignyana*, but which need further specimens to give them specific character.

Lagena orbignyana, var.—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
19109	U.S.N.M.	1	D2564....	39 22 00 N.; 71 23 30 W..	1,390	37.3	gy. oz.......	Rare.
19110	U.S.N.M.	1	D2080....	39 42 00 N.; 71 15 30 W..	525	....	gn. m.......	Rare.

LAGENA ORBIGNYANA (Seguenza), variety.

Plate 8, fig. 4.

The specimen figured has a peculiar central ornamentation consisting of irregular longitudinal lines caused by confluent edges of coarse pits.

The specimen is not well preserved except in the central region, but it may be a variety of this species.

Lagena orbignyana, var.—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
19111	U.S.N.M.	1	D2260....	° ′ ″ ° ′ ″ 40 13 15 N.; 69 29 15 W..	46	°F. 50.2	gy. s........	Rare.

LAGENA ORNATA Williamson.

Plate 8, figs. 6, 8.

Entosolenia marginata Montagu, var. *ornata* Williamson, Rec. Foram. Great Britain, 1858, p. 11, pl. 1, fig. 24.

Lagena ornata Jones, Parker, and H. B. Brady, Pal. Soc., vol. 19, 1866, p. 43, pl. 1, figs. 29–31.—Balkwill and Wright, Proc. Roy. Irish Acad., ser. 2, vol. 3, 1882, p. 548.—H. B. Brady, Journ. Roy. Micr. Soc., 1877, p. 907.—Whiteaves, Geol. Survey Canada, 1901, p. 10.—Heron-Allen and Earland, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 88, pl. 7, fig. 8; Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 252; Journ. Roy. Micr. Soc., 1916, p. 46.

Except for the record of Whiteaves this species seems to be recorded only from the British Isles. It has been undoubtedly confused with *Lagena lagenoides* Williamson, but seems to be distinct. Heron-Allen and Earland note that it "appears to be always constant to type, even in such *minutiae* as the curving of the entosolenian tube."

LAGENA OVUM (Ehrenberg).

Plate 8, figs. 9, 10.

Miliola ovum Ehrenberg, Berlin Monatsber., 1843, p. 166; Mikrogeologie, 1854, pl. 23, fig. 2; pl. 29, fig. 45; pl. 31, fig. 4.

Lagena ovum Marsson, Mitth. nat. Ver. Neu-Vorpom. Rügen, Jahrg. 10, 1878, p. 120, pl. 1, fig. 1.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 454, pl. 56, fig. 5.—Egger, Abh. kön. bay. Akad. Wiss. München, Cl. II, vol. 18, 1893, p. 323, pl. 10, fig. 9.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 5, pl. 2, fig. 2.—Heron-Allen and Earland, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 73, pl. 6, fig. 1; Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p 242.

Description.—Test elongate, elliptical in front view, nearly circular in cross section, slightly compressed, ends broadly rounded, nearly equal; wall thin, transparent, smooth; aperture broadly elliptical, central, with a comparatively short entosolenian neck.

Length 0.40 mm.

Distribution.—Brady had this species from *Challenger* station 5 in the deep part of the North Atlantic, in 2,740 fathoms (5,011 meters). Egger records it from off West Africa and Heron-Allen and Earland record a single typical specimen from Killary Bay, Ireland, and two specimens from off the west of Scotland.

LAGENA PARADOXA Sidebottom.

Plate 8, fig. 11.

Lagena foveolata Reuss ? var. *paradoxa* Sidebottom, Journ. Quekett Micr. Club, vol. 11, 1912, p. 395, pl. 16, figs. 22, 23.

Description.—Test flask-shaped, elongate, the basal end broadly rounded and the greatest width near the base, thence tapering gradually to the apical end, which is furnished with a short, cylindrical, slender neck with a slight phialine lip, the base of the neck rather abruptly joined with the test; wall of the test compound, the outer surface longitudinally costate, with fine crossbars between them, the inner layer more or less spinose connecting it with the surface wall, wall opaque.

Length up to 0.20 mm.

Distribution.—Sidebottom originally described this form from the Southwest Pacific. I have specimens from four *Albatross* stations which are very similar to those described and figured by Sidebottom. They are not as long nor quite so tapering as his specimens and the costae not so pronounced. They have a similar compound wall, and the general manner in which the neck is attached to the body of the test is also strikingly similar. It seems worthy of specific rank.

Worn specimens show the two layers, the outer one of which often flakes off from the under one.

Lagena paradoxa—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F		
19043	U.S.N.M.	1	D2093....	39 42 50 N.; 71 01 20 W..	1,000	39.0	for., s.......	Rare.
19044	U.S.N.M.	2	D2352....	22 35 00 N.; 84 23 00 W..	463	45.0	wh. co......	Rare.
19045	U.S.N.M.	1	D2535....	40 03 30 N.; 67 27 15 W..	1,149	37.8	gy. oz.......	Rare.
19046	U.S.N.M.	1	D2684....	39 35 00 N.; 70 54 00 W..	1,106	....	br. co.......	Rare.

LAGENA PERLUCIDA (Montagu).

Plate 8, figs. 12, 13.

Vermiculum perlucidum MONTAGU, Test. Brit., 1803, p. 525, pl. 14, fig. 3.
Lagena perlucida BROWN, Illust. Conch. Great Britain, 1827, fly-leaf, pl. 1, fig. 29; edition 2, 1844, p. 3, pl. 56, fig. 29.—SCHLUMBERGER, Fueille des Jeunes Naturalistes, ann. 13, 1882, pl. 1, fig. 2.—HERON-ALLEN and EARLAND, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 78; Trans. Zool. Soc. London, vol. 20, 1915, p. 659; Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 246; Journ. Roy. Micr. Soc., 1916, p. 45.
Lagena vulgaris WILLIAMSON, var. *perlucida* WILLIAMSON, Rec. Foram. Great Britain, 1858, p. 5, pl. 1, figs. 7, 8.

Description.—Test somewhat pyriform, elongate, widest near the base, the apertural end continued into an elongate cylindrical slender neck, with a slight lip, the opposite portion of the test with a few fine longitudinal costae, extended part way up the body of the test; surface otherwise smooth.

Length up to 0.25 mm.

Distribution.—All the records for this species seem to be from about the British Isles, except that of Heron-Allen and Earland, who record it as " few and poor " from the Kerimba Archipelago, off the southeastern coast of Africa. The only specimens I have had were from Dog's Bay, Ireland, and from 10 miles off Glencoe, southwest of Ireland, in 53 fathoms (97 meters), both from material received from Mr. Joseph Wright.

LAGENA PROTEA Chaster.

Plate 9, figs. 1, 2.

Lagena protea CHASTER, First Rep. Southport Soc. Nat. Sci., 1890–1891 (1892), p. 62, pl. 1, fig. 14.—SIDEBOTTOM, Mem. Proc. Manchester Lit. Philos. Soc., vol. 50, No. 5, 1906, p. 15, pl. 2, fig. 18; vol. 54, No. 16. 1910, p. 19, pl. 2, figs. 17, 18; Journ. Quekett Micr. Club, vol. 11, 1912. p. 427.—HERON-ALLEN and EARLAND, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 74, pl. 7, figs. 19, 20.

" This species occurs at four stations, the specimens being large and well developed. As the name implies, no two are alike. Mr. Sidebottom quotes a letter from the late Dr. Chaster supplementing his original description of the species, and replying to various criticisms to which the species had been subjected. In our opinion, this form remains one of the most unsatisfactory with regard to its affinities. There is little doubt that many of the specimens have originally been sessile, a habit which is otherwise unknown in the genus *Lagena*. Moreover, traces of apparent segmentation are not uncommon, which in itself would remove the species from the genus *Lagena* to *Polymorphina*. But the quantity of available material is not at present sufficient for final settlement of this question, and for the present we prefer to leave the species in the position to which Dr. Chaster assigned it, and in which Mr. Sidebottom, who has had wider opportunities of judging than ourselves, concurs. It may be observed that Messrs. Jones and Chapman include this species among their type-species of Ramulina."

The above notes are from Heron-Allen and Earland. The only Atlantic records for this species seem to be those of Chaster and Heron-Allen and Earland from about the British Isles.

LAGENA PULCHELLA H. B. Brady.

Plate 9, fig. 3.

Lagena pulchella H. B. BRADY, Rep. Brit. Assoc. (Nottingham), 1866, p. 70; Ann. Mag. Nat. Hist., ser. 4, vol. 6, 1870, p. 294, pl. 12, figs. 1*a*, *b*.—BALKWILL and MILLETT Journ. Micr., vol. 3, 1884, p. 82, pl. 2, fig. 13.—BALKWILL and WRIGHT, Trans. Roy. Irish Acad., vol. 28, 1885, p. 342, pl. 12, fig. 19.—H. B. BRADY, Journ. Roy. Micr. Soc., 1887, p. 906.—PEARCEY, Trans. Glasgow Nat. Hist. Soc., vol. 2, 1890, p. 177.—WRIGHT, Irish Nat., vol. 9, No. 3, 1900, p. 54.—HERON-ALLEN and EARLAND, Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 253.

All the records for this species seem to be from about the British Isles, where it has been recorded by numerous authors.

LAGENA PULCHELLA H. B. Brady, var. HEXAGONA Heron-Allen and Earland.

Plate 9, fig. 4.

Lagena pulchella H. B. BRADY, var. *hexagona* HERON-ALLEN and EARLAND, Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 254, pl. 41, fig. 27.

Heron-Allen and Earland describe this variety from a single specimen off the west of Scotland. They note that "in this very distinct variety the costae radiating from the oral end of the shell coalesce and form a hexagonal reticulation over the basal half of the faces of the test."

LAGENA QUADRATA (Williamson).

Plate 9, figs. 5, 6.

Entosolenia marginata MONTAGU, var. *quadrata* WILLIAMSON, Rec. Foram. Great Britain, 1858, p. 11, pl. 1, figs. 27, 28.

Lagena lucida WILLIAMSON, var. *quadrata* REUSS, Sitz. Akad. Wiss. Wien., vol. 46, pt. 1, 1862 (1863), p. 324, pl. 2, fig. 26.

Lagena quadrata H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 475, pl. 59, figs. 3, 16; Journ. Roy. Micr. Soc., 1887, p. 905.—EGGER, Abh. kön. bay. Akad. Wiss. München, Cl. II, vol. 18, 1893, p. 331, pl. 10, figs. 78, 79.—MILLETT, Journ. Roy. Micr. Soc., 1901, p. 496, pl. 8, fig. 18.—EARLAND, Journ. Quekett Micr. Club, ser. 2, vol. 9, No. 57, 1905, p. 214.—SIDEBOTTOM, Mem. Proc. Manchester Lit. Philos. Soc., vol. 50, No. 5, 1906, p. 8, pl. 1, figs. 21, 22; pl. 2, figs. 1-3.—BAGG, Proc. U. S. Nat. Mus., vol. 34, 1908, p. 142.—CHAPMAN, Subantarctic Ids. New Zealand, 1909, p. 339; Journ. Linn. Soc. Zool., vol. 30, 1910, p. 409.—SIDEBOTTOM, Mem. Proc. Manchester Lit. Philos. Soc., vol. 54, No. 16, 1910, p. 18, pl. 2, fig. 8[?]; Journ. Quekett Micr. Club, vol. 11, 1912, p. 405, pl. 17, figs. 26–28[?].—Bagg, Bull. 513, U. S. Geol. Survey, 1912, p. 50, pl. 14, figs. 19*a*, *b*, 20.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 35, pl. 14, fig. 9.—Heron-Allen and Earland, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 84; Trans. Zool. Soc. London, vol. 20, 1915, p. 662; Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 251; Journ. Roy. Micr. Soc., 1916, p. 46.

Lagena marginata (Walker and Boys), var. *quadrata* Balkwill and Wright, Proc. Roy. Irish Acad., ser. 2, vol. 3, 1882, p. 548.

Lagena laevigata (Reuss), var. *quadrata* Wright, Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 480.

Description.—Test compressed, somewhat quadrate in outline, usually somewhat keeled; aperture somewhat elongate; wall smooth.

Length up to 0.50 mm.

Distribution.—This species was originally described from off the British Isles by Williamson. It has since been recorded from about the British Isles by several authors. There are numerous records for its distribution elsewhere, but from the specimens I have seen from the western Atlantic and other regions the typical form is best seen in the eastern North Atlantic.

LAGENA QUADRICOSTULATA Reuss.

Lagena quadricostulata Reuss, Sitz. Akad. Wiss. Wien, vol. 62, 1870, p. 469.—Schlicht, Foram. Pietzpuhl, 1870, pl. 4, figs. 25–30.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 486, pl. 59, figs. 7 (?), 15.—Pearcey, Trans. Glasgow Nat. Hist. Soc., vol. 2, 1890, p. 177 (?).—Chapman, Proc. Zool. Soc. London, pt. 1, 1895, p. 29.—Wright, Irish Nat., vol. 9, No. 3, 1900, p. 54.—Earland, Journ. Quekett Micr. Club, ser. 2, vol. 9, No. 57, 1905, p. 214.—Chapman, Zool. Res. *Endeavour*, pt. 3, 1912, p. 311.—Pearcey, Trans. Roy. Soc. Edinb., vol. 39, 1914, p. 1021.—Chapman, Biol. Res. "*Endeavour*," vol. 3, pt. 1, 1915, p. 22.

Description.—"Test pyriform and more or less compressed, the margin obtuse or rounded, the base frequently mucronate, and the aperture entosolenian; the surface bears four arched costae, two on each face of the test, near the lateral margins and parallel to them. The costae are thickest near the middle and taper away toward the ends."

Length 0.25 mm.

Distribution.—The Atlantic records for this species consist of a questionable one of Pearcey as very rare in the Faroe Channel, and from the Summary of Results of the *Challenger* Expedition, it is recorded from station 13, in the North Atlantic, 1,900 fathoms (3,475 meters). Wright records it as common, with trigonal forms rare, from Dog's Bay, Ireland, and Earland records it from shore sands at Bognor, Sussex, rare. Pearcey records it from Burdwood Bank, in the South Atlantic, 56 fathoms (102 meters), and one deeper station, in 1,998 fathoms (3,654 meters).

LAGENA RENIFORMIS Sidebottom.

Plate 9, figs. 7–11.

Lagena reniformis SIDEBOTTOM, Journ. Quekett Micr. Club, vol. 12, 1913, p. 204, pl. 18, fig. 15.—HERON-ALLEN and EARLAND, Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 255, pl. 41, figs. 30–34.

The figures given here are copied from Heron-Allen and Earland, the specimens coming from off the coast of Scotland. There are no other records for the Atlantic.

LAGENA RETICULATA (Macgillivray).

Lagenula reticulata MACGILLIVRAY, Hist. Test. anim. Aberdeen, 1843, p. 38,

Lagena reticulata REUSS, Sitz. Akad. Wiss. Wien, vol. 46, pt. 1, 1862 (1863), p. 333, pl. 5, figs. 67, 68.—EARLAND, Journ. Quekett Micr. Club, ser. 2, vol. 9, No. 57, 1905, p. 213.—BALKWILL and MILLETT, Rec. Foram. Galway, 1908, p. 5.—HERON-ALLEN and EARLAND, Journ. Roy. Micr. Soc., 1909, p. 424; Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 76; Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 244; Journ. Roy. Micr. Soc., 1916, p. 44.

I have given simply the Atlantic references for this species which occurs about the British Isles. It has not occurred in the western Atlantic.

LAGENA RIZZAE (Seguenza).

Plate 9, fig. 14.

Fissurina rizzae SEGUENZA, Foram. mon. mioc. Messina, 1862, p. 72, pl. 2, fig. 50.

Lagena rizzae GOUGH, Dept. Agric. Fish. Ireland, Sci. Invest., 1905 (1906), p. 4, pl. 1, fig. 3.—HERON-ALLEN and EARLAND, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 89, pl. 7, fig. 9; Trans. Zool. Soc. London, vol. 20, 1915, p. 666; Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 253; Journ. Roy. Micr. Soc., 1916, p. 46.

Nearly all the records for this species are from the regions of the British Isles, it having been found by Gough, and at several localities by Heron-Allen and Earland. It may have been confused, as the last authors note, with *L. bicarinata* and *L. laevigata.* I have not found specimens from the western Atlantic referable to it.

LAGENA SEMILINEATA J. Wright.

Plate 9, figs. 12, 13.

Lagena semilineata WRIGHT, Rep. Belfast Nat. Field Club, 1885–1886, App., p. 320, pl. 26, fig. 7; Irish Nat., vol. 9, 1900, p. 54.—HERON-ALLEN and EARLAND, Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 246, pl. 41, figs. 21, 22.

The only records for this species seem to be those of Wright from off the coasts of Ireland, and Heron-Allen and Earland from off the coast of Scotland.

LAGENA SEMISTRIATA Williamson.

Plate 9, fig. 15.

Lagena striata (D'Orbigny), var. *semistriata* Williamson, Ann. Mag. Nat. Hist., ser. 2, vol. 1, 1848, p. 14, pl. 1, figs. 9, 10.

Lagena vulgaris Williamson, var. *semistriata* Williamson, Rec. Foram. Great Britain, 1858, p. 6, pl. 1, fig. 9.

Lagena sulcata (Walker and Jacob), var. *semistriata* Parker and Jones, Philos. Trans., vol. 155. 1865, p. 350, pl. 13, fig. 23.

Lagena semistriata Jones, Parker, and H. B. Brady, Monogr. Foram. Crag, 1866, p. 34, pl. 4, fig. 6.—Balkwill and Wright, Proc. Roy. Irish Acad., ser. 2, vol. 3, 1882, p. 548.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 465, pl. 57, figs. 14, 16, 17.—Balkwill and Wright, Trans. Roy. Irish Acad.. vol. 28, 1885, p. 339.—H. B. Brady, Journ. Roy. Micr. Soc., 1887, p. 903.—Wright, Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 479.—Robertson, Proc. Nat. Hist. Soc. Glasgow, pt. 3, 1892, p. 241.—Woodward, The Observer, vol. 4, 1893, p. 143.—Egger, Abh. kön. bay. Akad. Wiss. München, Cl. II, vol. 18, 1893, p. 327, pl. 10, figs. 34, 39.—Goës, Kongl. Svensk. Vet. Akad. Handl., vol. 25, No. 9, 1894, p. 76, pl. 13, fig. 737.—Morton, Proc. Portland Soc., 1897, p. 117.—Wright, Irish Nat., vol. 9, No. 3, 1900, p. 54.—Millett, Journ. Roy. Micr. Soc., 1901, p. 486, pl. 8. figs. 2, 3.—Whiteaves, Geol. Survey, Canada, 1901, p. 10.—Earland, Journ. Quekett Micr. Club, ser. 2, vol. 9, No. 57, 1905. p. 211.—Sidebottom, Mem. Proc. Manchester Lit. Philos. Soc., vol. 50, No. 5, 1906, p. 3.—Balkwill and Millett, Rec. Foram. Galway, 1908, p. 5.—Heron-Allen and Earland, Journ. Roy. Micr. Soc., 1909, p. 424.—Sidebottom, Mem. Proc. Manchester Lit. Philos. Soc., vol. 54, No. 16, 1910, p. 16, pl. 2, fig. 2.—Bagg, Bull. 513, U. S. Geol. Survey, 1912, p. 50, pl. 14. figs. 1–5.—Heron-Allen and Earland, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 78.—Pearcey, Trans. Roy. Soc. Edinb., vol. 49, 1914, p. 1018.—Heron-Allen and Earland, Trans. Zool. Soc. London, vol. 20, 1915, p. 658; Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 245; Journ. Roy. Micr. Soc., 1916. p. 45.—Cushman, Bull. 676, U. S. Geol. Survey, 1918, p. 9, pl. 2, fig. 3; Proc. U. S. Nat. Mus., vol. 56, 1919, p. 610; Bull. 100, U. S. Nat. Mus., vol. 4, 1921, p. 179.

Description.—Test typically consisting of a somewhat pyriform body, the base truncate and rounded, the upper end extending out into a long cylindrical neck with a slightly spreading lip; surface of the test ornamented by a few longitudinal costae, largely confined to the basal portion of the test, variable in length, surface otherwise smooth.

Length up to 0.30 mm.

Distribution.—I have had no specimens from the western Atlantic which seem to be this species, nor is it recorded from the region south of the Gulf of St. Lawrence. There are records for it off Labrador, in Gaspé Bay, in the Gulf of St. Lawrence. It is very numerous about the British Isles, as the long list of references shows, and there are a few other records for it elsewhere.

Lagena semistriata—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
						°F.		
......	JAC......	9	*Lord Bandon*, Log. 28.	Off Baltimore, southwest Ireland.	26	....	....	Common
......	JAC......	1	*Lord Bandon* Log. 58.	Off Bantry Bay, southwest Ireland.	110	....	....	Rare.
......	JAC......	1	*Flying Falcon* Log. 8.	10 miles off Glencoe, southwest Ireland.	53	....	m., s........	Rare.

LAGENA SPUMOSA Millett.

Plate 10, figs. 1, 2.

Heron-Allen and Earland[14] record and figure two specimens from the west coast of Scotland. They also had it from 1,280 meters (700 fathoms) in the Faroe Channel, and 260 meters (142 fathoms) in Hilte Fjord, Norway, as well as from the Mediterranean. It was originally described from the Pacific.

LAGENA SQUAMOSA (Montagu).

Plate 10, figs. 3, 4.

Vermiculum squamosum Montagu, Test. Brit., 1803, p. 526, pl. 14, fig. 2.

Entosolenia squamosa Williamson, Ann. Mag. Nat. Hist., ser. 2, vol. 1, 1848, pl. 2, fig. 19; Rec. Foram. Great Britain, 1858, p. 12, pl. 1, fig. 29.

Lagena squamosa Brown, Ill. Rec. Conch. Great Britain, 1844, pl. 1, fig. 32.—Jones, Parker, and H. B. Brady, Monogr. Foram. Crag, 1866, p. 39, pl. 4, fig. 7.—Balkwill and Wright, Proc. Roy. Irish Acad., ser. 2, vol. 3, 1882, p. 548.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 471, pl. 58, figs. 28-31.—Balkwill and Wright, Trans. Roy. Irish Acad., vol. 28, 1885, p. 340, pl. 14, fig. 9.—H. B. Brady, Journ. Roy. Micr. Soc., 1887, p. 904.—Pearcey, Trans. Glasgow Nat. Hist. Soc., vol. 2, 1890, p. 177.—Wright, Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 479.—Robertson, Proc. Nat. Hist. Soc. Glasgow, pt. 3, 1892, p. 41.—Egger, Abh. kön. bay. Akad. Wiss. München, Cl. II, vol. 18, 1893, p. 326, pl. 10, figs. 58, 59.—Woodward, The Observer, vol. 4, 1893, p. 143.—Goës, Kongl. Svensk. Vet. Akad. Handl., vol. 25, 1894, p. 79, pl. 13, fig. 745.—Morton, Proc. Portland Soc., vol. 2, 1897, p. 117.—Wright, Irish Nat., vol. 9, No. 3, 1900, p. 54.—Millett, Journ. Roy. Micr. Soc., 1901, p. 9.—Whiteaves, Geol. Survey Canada, 1901, p. 10.—Earland, Journ. Quekett Micr. Club, ser. 2, vol. 9, No. 57, 1905, p. 212.—Heron-Allen and Earland, Journ. Roy. Micr. Soc., 1907, p. 424.—Balkwill and Millett, Rec. Foram. Galway, 1908, p. 5.—Chapman, Subantarctic Ids. New Zealand, 1909, p. 335, pl. 15, fig. 5.—Bagg, U. S. Geol. Survey Bull. 513, 1912, p. 51, pl. 14, fig. 27.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 16, pl. 6, fig. 1.—Heron-Allen and Earland, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 76, pl. 7, fig.

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[14] Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 245, pl. 41, figs. 19, 20.

13.—Pearcey, Trans. Roy. Soc., Edinb., vol. 49, 1914, p. 1018.—Chapman, Biol. Res. *Endeavour*, vol. 3, pt. 1, 1915, p. 22.—Heron-Allen and Earland, Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 244; Journ. Roy. Micr. Soc., 1916, p. 44.—Mestayer, Trans. New Zealand Inst., vol. 48, 1916, p. 129.—Chapman, Brit. Antarctic Exped., Geology, vol. 2, 1916–17, p. 31, pl. 3, fig. 18.—Cushman, Proc. U. S. Nat. Mus., vol. 56, 1919, p. 608.

Entosolenia globosa Montagu, var. *squamosa* Parker and Jones, Ann. Mag. Nat. Hist., ser. 2, vol. 19, 1857, p. 278, pl. 11, fig. 25.

Description.—Test subglobular, broadly rounded at the apertural end or somewhat truncate; surface reticulate, apertural end of each areole being arched, giving the appearance of overlapping scales.

Length up to 0.30 mm.

Distribution.—Specimens of this type were originally described from about the British Isles, and have been referred to by many authors as the above synonymy will show. It is very evident from an examination of the various figures given that numerous forms of ornamentation have been included under this name. I have failed to find any specimens from the *Albatross* material from the western Atlantic which can be referred to this, but I have very typical specimens from off the British Isles. Whether the specimens from remote parts of the world which have been referred to this species are identical is very questionable.

Lagena squamosa—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°*F.*		
......	J.A.C....	1	....	Dog's Bay, Ireland.......	....	....	....	Rare.
......	J.A.C....	1	*Lord Bandon* Log 28.	Off Baltimore, southwest Ireland.	26	....	....	Rare.

LAGENA STAPHYLLEARIA (Schwager).

Fissurina staphyllearia Schwager, *Novara*-Exped., Geol. Theil, vol. 2, 1866, p. 209, pl. 5, fig. 24.

Lagena staphyllearia H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 474, pl. 59, figs. 8–11.—Wright, Ann. Mag. Nat. Hist., vol. 4, ser. 6, 1889, p. 448; Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 481.—Chapman, Proc. Zool. Soc. London, pt. 1, 1895, p. 29.—Flint, Rep. U. S. Nat. Mus., 1897 (1899), p. 307, pl. 54, fig. 1.—Millett, Journ. Roy. Micr. Soc., 1901, p. 619, pl. 14, fig. 2.—Dakin, Rep. Ceylon Pearl-Oyster Fish., vol. 5, 1906, p. 234.—Chapman, Journ. Linn. Soc. Zool., vol. 30, 1910, p. 410.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 31, pl. 17, fig. 3.—Pearcey, Trans. Roy. Soc., Edinb., vol. 49, 1914, p. 1019.—Heron-Allen and Earland, Trans. Zool. Soc. London, vol. 20, 1915, p. 664.

Description.—Test ovate, compressed, wall smooth, periphery usually keeled, with several spines symmetrically arranged about the border; aperture fissurine.

Length about 0.50 mm.

Distribution.—There are very few Atlantic records for this species. There is a single *Challenger* station from the middle Atlantic which is south of the Equator, one *Gazelle* station recorded by Egger from off West Africa, one *Albatross* station recorded by Flint in the Caribbean, off Panama, and Pearcey records it from the far South Atlantic in deep water. I have a single specimen which can be referred to this species from *Albatross* station D2174, off the eastern coast of the United States in deep water. The species was originally described from the late Tertiary of Kar Nicobar. As the few records show, it has been recorded from many widely separated regions. Except for the records of Wright in deep water off the southwestern coast of Ireland, there seem to be no records from the region of the British Isles.

Lagena staphyllearia—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°*F.*		
19060	U.S.N.M.	1	D2174....	38 15 00 N.; 72 03 00 *W*....	1594	....	gy. m.......	Rare.

LAGENA STELLIGERA H. B. Brady.

Plate 10, figs. 5, 6.

Lagena stelligera H. B. Brady, Quart. Journ. Micr. Sci., vol. 21, 1881, p. 60; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 466, pl. 57, figs. 35, 36.—Pearcey (?), Trans. Glasgow Nat. Hist. Soc., vol. 2, 1890, p. 177.—Earland, Journ. Quekett Micr. Club, ser. 2, vol. 9, No. 57, 1905, p. 212.—Chapman, Journ. Linn. Soc. Zool., vol. 30, 1910, p. 407.—Sidebottom, Journ. Quekett Micr. Club, vol. 11, 1912, p. 391, pl. 15, figs. 28, 29; pl. 16, figs. 1–4.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 26, pl. 12, fig. 3.—Pearcey, Trans. Roy. Soc. Edinb., vol. 49, 1914, p. 1018.

Brady's *Challenger* stations included both the North and South Atlantic, but mostly in deep water. Pearcey records this species with a question from the Faroe Channel, and Earland a single specimen from shore-sand at Bognor, Sussex. I have failed to find any material in the western Atlantic referable to this species.

LAGENA STEWARTII J. Wright.

Plate 10, fig. 7.

Lagena stewartii J. WRIGHT, Rep. Belfast Nat. Field Club, ser. 2, vol. 3, No. 6, App. No. 2, 1910–1911, p. 12, pl. 2, fig. 8.—HERON-ALLEN and EARLAND, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 81, pl. 6, figs. 2, 3.

Description.—"Test circular, compressed, the two faces convex, surface smooth, peripheral edge rounded, short entosolenian tube; aperture oval."

Distribution.—The only record for the species in the recent state is that of Heron-Allen and Earland, who record a few specimens from one station in the Clare Island region. Wright's specimens were fossil.

The above description is from Wright, and the figures are from Heron-Allen and Earland.

LAGENA STRIATA (D'Orbigny).

Plate 10, fig. 9.

Oolina striata D'ORBIGNY, Foram. Amér. Mérid., 1839, p. 21, pl. 5, fig. 12.

Lagena striata REUSS, Sitz. Akad. Wiss. Wien, vol. 46, pt. 1, 1862 (1863), p. 327, pl. 3, figs. 44, 45; pl. 4, figs. 46, 47.—BALKWILL and WRIGHT, Proc. Roy. Irish Acad., ser. 2, vol. 3, 1882, p. 547.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 460, pl. 57, figs. 22, 24.—BALKWILL and WRIGHT, Trans. Roy. Irish Acad., vol. 28, 1885, p. 337.—H. B. BRADY, Journ. Roy. Micr. Soc., 1887, p. 903.—H. B. BRADY, PARKER, and JONES, Trans. Zool. Soc. London, vol. 12, 1888, p. 222, pl. 44, fig. 28.—PEARCEY, Trans. Glasgow Nat. Hist. Soc., vol. 2, 1890, p. 177.—WRIGHT, Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 478.—ROBERTSON, Proc. Nat. Hist. Soc. Glasgow, pt. 3, 1892, p. 241.—EGGER, Abh. kön. bay. Akad. Wiss. München, Cl. II, vol. 18, 1893, p. 327, pl. 10, figs. 21–23.—MORTON, Proc. Portland Soc., vol. 2, 1897, p. 116.—WRIGHT, Irish Nat., vol. 9, No. 3, 1900, p. 54.—MILLETT, Journ. Roy. Micr. Soc., 1901, p. 487.—CHAPMAN, The Foraminifera, 1902, p. 402; Trans. New Zealand Inst., vol. 38, 1905, p. 91.—EARLAND, Journ. Quekett Micr. Club, ser. 2, vol. 9, No. 57, 1905, p. 211.—GODDARD, Rec. Austr. Mus., vol. 6, 1905–1907, p. 308.—SIDEBOTTOM, Mem. Proc. Manchester Lit. Philos. Soc., vol. 50, No. 5, 1906, p. 2.—BALKWILL and MILLETT, Rec. Foram. Galway, 1908, p. 5.—HERON-ALLEN and EARLAND, Journ. Roy. Micr. Soc., 1909, p. 423.—CHAPMAN, Journ. Linn. Soc. Zool., vol. 30, 1910, p. 408.—SIDEBOTTOM, Mem. Proc. Manchester Lit. Philos. Soc., vol. 54, No. 16, 1910, p. 15, pl. 1, figs. 16, 19, 20; pl. 2, fig. 1.—BAGG, Bull. 513, U. S. Geol. Survey, 1912, p. 51, pl. 14, fig. 6.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 19, pl. 7, figs. 4, 5.—HERON-ALLEN and EARLAND, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 78.—PEARCEY, Trans. Roy. Soc. Edinb., vol. 49, 1914, p. 1017.—CHAPMAN, Biol. Res. *Endeavour*, vol. 3, pt. 1, 1915, p. 22.—HERON-ALLEN and EARLAND, Trans. Linn. Soc. London ser. 2, vol. 11, 1916, p. 246; Journ. Roy. Micr. Soc., 1916, p. 45.—MESTAYER, Trans. New Zealand Inst., vol. 48, 1916, p. 129.—CUSHMAN Proc. U. S. Nat. Mus., vol. 56, 1919, p. 609; Bull. 100, U. S. Nat Mus., vol. 4, 1921, p. 177.

Description.—Test flask-shaped, nearly circular in cross section, body of test subglobular, neck variable in length, usually rather abruptly contracted from the body of the test at its base; surface ornamented with numerous rather fine costae running the entire length of the test, apical end typically broadly rounded, occasionally slightly tapering to a point.

Length 0.25–0.75 mm.

Distribution.—From the list of references it would seem that this is a very widely distributed species. There are numerous records for it about the British Isles and a few others from various parts of the Atlantic, as well as in other regions. However, all the striate *Lagenae* I have had from the western Atlantic seem to be better placed under other species.

LAGENA STRIATO-PUNCTATA Parker and Jones.

Plate 10, fig. 10.

Lagena sulcata (Walker and Jacob), var. *striato-punctata* Parker and Jones, Philos. Trans., vol. 155, 1865, p. 350, pl. 18, figs. 25–27.

Entosolenia striato-punctata G. M. Dawson, Can. Nat., vol. 5, 1870, p. 178, woodcut, p. 180, fig. 11.

Lagena striato-punctata H. B. Brady, Ann. Mag. Nat. Hist., ser. 5, vol. 1, 1878, p. 434, pl. 20, fig. 3.—Balkwill and Wright, Proc. Roy. Irish Acad., ser. 2, vol. 3, 1882, p. 548.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 468, pl. 58, figs. 37, 40.—Balkwill and Wright, Trans. Roy. Irish Acad., vol. 28, 1885, p. 339, pl. 14, fig. 20.—H. B. Brady, Journ. Roy. Micr. Soc., 1887, p. 904.—Wright, Ann. Mag. Nat. Hist., vol. 4, ser. 6, 1889, p. 448; Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 479.—Egger, Abh. kön. bay. Akad. Wiss. München, Cl. II, vol. 18, 1893, p. 327, pl. 10, figs. 35, 36, 44–46.—Goës, Kongl. Svensk. Vet. Akad. Handl., vol. 25, 1894, p. 83, pl. 13, fig. 753.—Millett, Journ. Roy. Micr. Soc., 1901, p. 489, pl. 8, fig. 6.—Whiteaves, Geol. Survey Canada, 1901, p. 10.—Sidebottom, Mem. Proc. Manchester Lit. Philos. Soc., vol. 50, No. 5, 1906, p. 4; vol. 54, No. 16, 1910, p. 17, pl. 2, fig. 5; Journ. Quekett Micr. Club, vol. 11, 1912, p. 392, pl. 16, figs. 7–10.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 30, pl. 14, fig. 10.—Heron-Allen and Earland, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 80; Trans. Zool. Soc. London, vol. 20, 1915, p. 660; Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 247.

Description.—"Test oval, pyriform, or flask-shaped, and either ecto- or entosolenian. It is decorated externally with tolerably stout longitudinal costae, from 6 to 20 in number, bearing conspicuous pseudopodial foramina. The perforations are placed either in single rows down the middle of the costae or in double lines, one on each side, in their thickened bases."

Length 0.30–0.50 mm.

Distribution.—There are numerous records for this species off the British Isles and in other parts of the Atlantic, off Spitzbergen, (1899), p. 307, pl. 53, fig. 7.—MORTON, Proc. Portland Soc., vol. 2, 1897, p. 116.—WRIGHT, Irish Nat., vol. 9, No. 3, 1900, p. 53.—WHITEAVES, Geol. Survey Canada, 1901, p. 10.—EARLAND, Journ. Quekett Micr. Club, ser. 2, vol. 9, No. 57, 1905, p. 211.—BALKWILL and MILLETT, Rec. Foram. Galway, 1908, p. 5.—HERON-ALLEN and EARLAND, Journ. Roy. Micr. Soc., 1909, p. 423.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 22, pl. 9, fig. 2.—HERON-ALLEN and EARLAND, Proc. Roy. Irish. Acad., vol. 31, pt. 64, 1913, p. 79; Trans. Linn. Soc. London, 1916, p. 246; Journ. Roy. Micr. Soc., 1916, p. 45.

Description.—Test typically subglobose, very slightly longer than broad, the neck fairly long and cylindrical, ornamentation consisting of numerous, 14–18, distinct elevated costae, running from the basal end of the test to the apertural end, and a few of them often continued in a spiral manner the length of the neck itself.

Length up to 0.35 mm.

Distribution.—About the British Isles this seems to be a very common species, but specimens which can be referred to the typical form seem to be very rare from the western side of the Atlantic. There are numerous records of its occurrence from many parts of the oceans, but specimens are not usually figured and it is difficult to say what the distribution of this typical form may be. Many things have been placed under this name which are very different from the typical western European form of the species.

Lagena sulcata—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
......	J.A.C....	7	*Lord Bandon*, Log 28.	Off Baltimore, southwest Ireland.	°*F.* 26	......	....	Frequent.
......	J.A.C....	1	*Flying Falcon*, Log 8.	10 miles off Glencoe, southwest Ireland.	53	......	m., s........	Rare.

LAGENA SULCATA (Walker and Jacob), var. APICULATA Cushman.

Plate 11, fig. 2.

Lagena sulcata, apiculate forms, H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, pl. 58, figs. 4, 17 (?).

Lagena sulcata (WALKER and JACOB), var. *apiculata* CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 23, pl. 9, figs. 3, 4; Proc. U. S. Nat. Mus., vol. 56, 1919, p. 609; Bull. 100, U. S. Nat. Mus., vol. 4, 1921, p. 180.

Description.—Variety differing from the typical in having the apical end drawn out into a stout spine, the apertural end with a tapering cylindrical neck with a phialine lip, usually without other ornamentation, body of the test with numerous longitudinal costae, as in the typical form.

into an elongate neck; wall of the test with numerous fine longitudinal costae, as many as 50 or 60 in number, running from the base of the chamber to the base of the neck.

Length up to 0.50 mm.

Distribution.—This was originally described by Williamson as *Lagena substriata*, but later has been placed under *Lagena striata* (D'Orbigny) as a synonym. The original figure of D'Orbigny for *Oolina striata* shows a test with the body about as long as broad, very different in shape from that figured by Williamson. An examination of British bottom samples seems to show that this typical form figured by Williamson is common about the British Isles, and while it may vary to a certain extent, it seems as though it might be recognized as a valid species. I have had a single specimen from *Albatross* station D2035, off the northeastern coast of the United States, which seems identical with British specimens, but it has not occurred elsewhere in the western Atlantic collections of the *Albatross*, so far as I have seen. It is evidently included by many British authors under the name *Lagena striata* (D'Orbigny).

Lagena substriata—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°*F.*		
19003	U.S.N.M.	1	D2035....	39 26 16 N.; 70 02 37 W..	1,362	....	glob., oz.....	Rare.
......	J.A.C....	4	*Flying Falcon* Log 8.	10 miles off Glencoe, southwest Ireland.	53	....	m., s........	Few.
......	J.A.C....	5	*Lord Bandon*, Log 28.	Off Baltimore, southwest Ireland.	26	....	....	Frequent.

LAGENA SULCATA (Walker and Jacob).

Plate 11, fig. 1.

"Serpula (Lagena) striata sulcata rotundata" Walker and Boys, Test. Min., 1784, p. 2, pl. 1, fig. 6.

Serpula (*Lagena*) *sulcata* Walker and Jacob, Adams' Essays, Kanmacher's ed., 1798, p. 634, pl. 14, fig. 5.

Lagena sulcata Parker and Jones, Philos. Trans., vol. 155, 1865, p. 351.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 462, pl. 57, figs. 23, 26, 33, 34.—Balkwill and Wright, Trans. Roy. Irish Acad., vol. 28, 1885, p. 338, pl. 14, figs. 1, 2.—H. B. Brady, Journ. Roy. Micr. Soc., 1887, p. 903.—H. B. Brady, Parker, and Jones, Trans. Zool. Soc. London, vol. 12, 1888, p. 222, pl. 44, figs. 18, [22?], [34?].—Wright, Ann. Mag. Nat. Hist., vol. 4, ser. 6, 1889, p. 414.—Pearcey, Trans. Glasgow Nat. Hist. Soc., vol. 2, 1890, p. 177.—Wright, Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 479.—Woodward, The Observer, vol. 4, 1893, p. 143.—Goës, Kongl. Svensk. Vet. Akad. Handl., vol. 25, No. 9, 1894, p. 78, pl. 13, figs. 742–744.—Flint, Rep. U. S. Nat. Mus., 1897

(1899), p. 307, pl. 53, fig. 7.—MORTON, Proc. Portland Soc., vol. 2, 1897, p. 116.—WRIGHT, Irish Nat., vol. 9, No. 3, 1900, p. 53.—WHITEAVES, Geol. Survey Canada, 1901, p. 10.—EARLAND, Journ. Quekett Micr. Club, ser. 2, vol. 9, No. 57, 1905, p. 211.—BALKWILL and MILLETT, Rec. Foram. Galway, 1908, p. 5.—HERON-ALLEN and EARLAND, Journ. Roy. Micr. Soc., 1909, p. 423.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 22, pl. 9, fig. 2.—HERON-ALLEN and EARLAND, Proc. Roy. Irish. Acad., vol. 31, pt. 64, 1913, p. 79; Trans. Linn. Soc. London, 1916, p. 246; Journ. Roy. Micr. Soc., 1916, p. 45.

Description.—Test typically subglobose, very slightly longer than broad, the neck fairly long and cylindrical, ornamentation consisting of numerous, 14–18, distinct elevated costae, running from the basal end of the test to the apertural end, and a few of them often continued in a spiral manner the length of the neck itself.

Length up to 0.35 mm.

Distribution.—About the British Isles this seems to be a very common species, but specimens which can be referred to the typical form seem to be very rare from the western side of the Atlantic. There are numerous records of its occurrence from many parts of the oceans, but specimens are not usually figured and it is difficult to say what the distribution of this typical form may be. Many things have been placed under this name which are very different from the typical western European form of the species.

Lagena sulcata—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
......	J.A.C....	7	*Lord Bandon*, Log 28.	Off Baltimore, southwest Ireland.	•*F.* 26	......	....	Frequent.
......	J.A.C....	1	*Flying Falcon*, Log 8.	10 miles off Glencoe, southwest Ireland.	53	......	m., s........	Rare.

LAGENA SULCATA (Walker and Jacob), var. APICULATA Cushman.

Plate 11, fig. 2.

Lagena sulcata, apiculate forms, H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, pl. 58, figs. 4, 17 (?).

Lagena sulcata (WALKER and JACOB), var. *apiculata* CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 23, pl. 9, figs. 3, 4; Proc. U. S. Nat. Mus., vol. 56, 1919, p. 609; Bull. 100, U. S. Nat. Mus., vol. 4, 1921, p. 180.

Description.—Variety differing from the typical in having the apical end drawn out into a stout spine, the apertural end with a tapering cylindrical neck with a phialine lip, usually without other ornamentation, body of the test with numerous longitudinal costae, as in the typical form.

Distribution.—The only *Albatross* specimens I have had from the Atlantic are from the Caribbean and from off the northeastern coast of Brazil. It occurs at numerous stations in the Pacific in fairly deep water.

Lagena sulcata, var. apiculata—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
19057	U.S.N.M.	1	D2144....	9 49 00 N.; 79 31 30 W..	896	....	gn. m.......	Rare.
19058	U.S.N.M.	2	D2756....	3 22 00 S.; 37 49 00 W..	417	40.5	gy. spk......	Rare.

LAGENA TRIGONO-MARGINATA Parker and Jones.

Plate 11, figs. 3, 4.

Lagena trigono-marginata Parker and Jones, Philos. Trans., vol. 155, 1865, p. 348, pl. 18, figs. 1*a*, *b*.—Robertson (in G. S. Brady and Robertson), Rep. Brit. Assoc., 1875, p. 190.—Wright, Proc. Belfast Nat. Field Club, 1876 (1877), App., p. 104, pl. 4, figs. 8*a*, *b*.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 482, pl. 61, figs. 12, 13.—Egger, Abh. kön. bay. Akad. Wiss. München, Cl. II, vol. 18, 1893, p. 336, pl. 10, figs. 54, 55.—Chapman, Journ. Linn. Soc. Zool., vol. 30, 1910, p. 410.—Pearcey, Trans. Roy. Soc. Edinb., vol. 49, 1914, p. 1019.

Lagena marginata Walker and Boys, var. *trigono-marginata* Balkwill and Wright, Proc. Roy. Irish Acad., ser. 2, vol. 3, 1882, p. 548.

Description.—Test triangular in transverse section, the three faces somewhat convex, the angles marked by raised bands with a distinct carina down the center of each; wall otherwise smooth; aperture circular, only slightly produced.

Length up to 0.30 mm.

Distribution.—I have found no specimens of this species from the western Atlantic material, but have it from Nymph Bank, south of Cork, Ireland, in 52 fathoms (95 meters), from material received from Joseph Wright. There are records for the species from off Funafuti, off New Amsterdam, and from Burdwood Bank. Brady's records are from two *Challenger* stations off Raine Island, Torres Strait, 155 fathoms (283 meters), and in the deep water of the North Pacific, 2,300 fathoms (4,200 meters). He also gives it from two *Porcupine* dredgings in the North Atlantic, off the west coast of Ireland, 90 and 1,360 fathoms (165 and 2,487 meters). It is also recorded from Dublin Bay (Balkwill and Wright), in the Estuary of the Dee (Siddall), and off the coast of Yorkshire (Robertson).

LAGENA TRUNCATA H. B. Brady.

Plate 11, figs. 5, 6.

Lagena truncata H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 457, pl. 56, figs. 31, 32.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 31, pl. 19, fig. 3.—PEARCEY, Trans. Roy. Soc. Edinb., vol. 49, 1914, p. 1017.

Description.—Test elongate, pyriform; greatest breadth below the middle, aboral end broadly rounded; apertural end obtusely rounded; wall smooth; aboral end with two or more short spines; aperture radiate.

Length, 0.40–1 mm.

Distribution.—In the *Challenger* report Brady records this species from two Atlantic stations, one in the North Atlantic, southwest of the Canaries, in 2,740 fathoms (5,017 meters), and one in the South Atlantic, west of Tristan d'Acunha, in 2,200 fathoms (4,024 meters). In the volume on Summary of Results of the *Challenger* Expedition it is also recorded from station 2, in 1,945 fathoms (3,557 meters), and station 13, in 1,900 fathoms (3,475 meters), between Teneriffe and Sombrero Islands. Pearcey records it from the Antarctic at two *Scotia* stations, also in deep water. Brady records it also from the South Pacific, in 1,825 and 2,070 fathoms (3,338 and 3,786 meters), and I have had it from a *Nero* station in the North Pacific, in 1,321 fathoms (2,424 meters). It is therefore a species rather widely distributed in deep, cold waters.

LAGENA TUBULIFERA Egger.

Lagena tubulifera EGGER, Abh. kön. bay. Akad. Wiss. München, Cl. II, vol. 18, 1893, p. 324, pl. 10, figs. 6, 7.

Under this name Egger describes a new species of *Lagena* from *Gazelle* station 156, in 3,950 meters (2,160 fathoms), between Montevideo and Tristan d'Acunha. As Brady has already used the name *tubulifera* in 1881, by the rules of priority this name can not be used again under this genus. Therefore if Egger's species proves to be a valid one, a new name will have to be made for it.

LAGENA UNGUIS Heron-Allen and Earland.

Plate 11, fig. 7.

Lagena unguis HERON-ALLEN and EARLAND, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 86, pl. 7, figs. 1–3; Journ. Roy. Micr. Soc., 1916, p. 46.

Description.—"Test inequilateral, compressed, extremely hyaline, resembling *L. marginata*, but with a continuous marginal carina produced considerably at the oral extremity of the shell and curved like a 'filbert-shaped' finger-nail. The aperture is placed in a depressed opening on the outer or convex surface of the 'nail' just above the upper edge of the chamber, and is furnished with a curved attached entosolenian tube which runs down the wall of the test on the inner side of the shell, i. e. that opposed to the convex side.

"Average breadth across wing, 0.08–0.15 mm.; average length across wing, 0.10–0.20 mm.; average length of chamber, 0.08–0.15 mm.; average breadth of chamber, 0.07–0.14 mm.

"This little form, though very distinctive in appearance, is difficult to describe; but it may be compared to a human finger nail detached from the flesh and with a little cyst growing upon its concave surface. It is, no doubt, closely allied to *L. marginata* and Mr. Wright's var. *inaequilateralis* of that species, but can not be confused with either of these. Its nearest affinity appears to be *L. irregularis* Sidebottom, which closely resembles our species in the relation of the chamber to the surrounding carina, but has a bicarinate periphery and differs also from ours in the position of its aperture, which is situated between the two keels.

"The species occurs in many of the *Goldseeker* dredgings in the North Sea and round the Scottish coast and is quite distinctive in its appearance."

The above is the original description and notes of Heron-Allen and Earland on this species. They also recorded it as very rare off South Cornwall.

LAGENA WILLIAMSONI (Alcock).

Plate 11, figs. 8, 9.

Entosolenia williamsoni ALCOCK, Proc. Lit. Philos. Soc., vol. 4, 1865, p. 198.

Lagena williamsoni WRIGHT, Proc. Belfast Nat. Field Club, 1876–7, App. 4, p. 104, pl. 4, fig. 14.—BALKWILL and WRIGHT, Proc. Roy. Irish Acad., ser. 2, vol. 3, 1882, p. 547; Trans. Roy. Irish Acad., vol. 28, 1885, p. 339, pl. 14, figs. 6–8.—H. B. BRADY, Journ. Roy. Micr. Soc., 1887, p. 903.—WRIGHT, Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 479.—ROBERTSON, Proc. Nat. Hist. Soc. Glasgow, pt. 3, 1892, p. 241.—Goës, Kongl. Svensk. Vet. Akad. Handl., vol. 25, No. 9, 1894, p. 79.—WRIGHT, Irish Nat., vol. 9, No. 3, 1900, p. 54.—EARLAND, Journ. Quekett Micr. Club, ser. 2, vol. 9, No. 57, 1905, p. 212.—BALKWILL and MILLETT, Rec. Foram. Galway, 1908, p. 5.—HERON-ALLEN and EARLAND, Journ. Roy. Micr. Soc., 1909, p. 424; Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 80; Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 247; Journ. Roy. Micr. Soc., 1916, p. 45.

Description.—Test somewhat pyriform, circular in transverse section, basal end broadly rounded, apertural end somewhat extended; surface ornamented by numerous longitudinal costae, 14–18 in number, the upper portion of these coalescing and forming a collar made up of a reticulate network below the aperture; aperture rounded, sometimes with a slight lip.

Length up to 0.50 mm.

Distribution.—This is a common species about the British Isles, and except for the single record of Heron-Allen and Earland,[15] who record a single specimen from the Kerimba Archipelago, off the southeastern coast of Africa, all the other records are from British or adjacent waters, although one of Goës's records is from off Spitzbergen, but he does not figure specimens. I have specimens in my collection from the localities given in the table. There have been no specimens in the western Atlantic material which could be referred to this species.

Lagena williamsoni—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature. °F.	Character of bottom.	Abundance.
......	J.A.C....	10+	*Flying Falcon* Log 8.	10 miles off Glencoe, southwest Ireland.	53	......	m., s........	Abundant.
......	J.A.C....	8	*Lord Bandon*, Log 28.	Off Baltimore, southwest Ireland.	26	......	....	Common.
......	J.A.C....	10+	....	Dog's Bay, Ireland......	......	......	....	Abundant

Subfamily 2. NODOSARIINAE.

Test polythalamous; chambers arranged in a straight, arcuate, planospiral or uncoiling series; apertures either radiate or with a neck and phialine lip.

Genus NODOSARIA Lamarck, 1812.

Nodosaria LAMARCK (type *N. raphanistrum* (Linnaeus)), Extrait Cours Zool., 1812, p. 121; Hist. Anim. Sans. Vert., vol. 7, 1822, p. 596.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 488.—CHAPMAN, The Foraminifera, 1902, p. 188.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 46.

Description.—Test composed of a straight or arcuate series of chambers, either loosely joined together by stolons or close set and overlapping or various forms between; surface smooth or ornamented; aperture either radiate or with a definite neck and phialine lip.

As indicated in the introduction, there are two more or less distinct groups which are placed under this genus. In one the aperture is radiate, in the other it has an elongate neck and phialine lip. Usually those forms which have the radiate aperture have comparatively thick heavy tests; those with the neck and phialine lip more often have the thin hyaline test. In both groups both microspheric and megalospheric forms occur. Where the proloculum is megalospheric, it is often the largest chamber of the test, and the number of chambers is often comparatively few. The microspheric form of the same species may start with a very small proloculum and the number of chambers be several times that of the other form. The ornamentation in the group is usually confined to longitudinal costae, or modifications of them, or of spines. In some species there is a definite senescent character in the loss of ornamentation in the later chambers. Other species may show a very definite shape in the last-formed chamber in the adult or in senescent forms, which may be often widely separated from the previously close-set series of chambers.

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[15] Trans. Zool. Soc. London, vol. 20, 1915, p. 659.

Other subgenera have been used, such as *Glandulina*, in which there is a tendency for the chambers to reach back and overlap the preceding ones, the last chamber being short and the sutures either close together or indistinct. In *Dentalina* there is a tendency toward a curved form, with the sutures oblique instead of at right angles to the axis of the test. In the microspheric form of such species there is much greater obliquity of the sutures and usually a greater curvature to that portion of the test. Such species are related to *Marginulina*, *Vaginulina*, and the uncoiled forms of *Cristellaria*. They indicate that perhaps even *Nodosaria* originated from a coiled ancestor, the coiling being usually lost, except as it shows in the microspheric form. If such is the development of *Nodosaria*, it is a derivative from a coiled form, similar to *Cristellaria*, rather than the coiled forms being derived from straight forms. As both *Cristellaria* and *Nodosaria* are recorded from the Cambrian, it is difficult to say which came first geologically.

As with *Lagena*, the species of *Nodosaria* are here grouped for convenience, usually according to their ornamentation.

NODOSARIA ROTUNDATA (Reuss).

Glandulina rotundata Reuss, Denkschr. Akad. Wiss. Wien, vol. 1, 1849, p. 366, pl. 46, fig. 2.

Nodosaria (*Glandulina*) *rotundata* H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 491, pl. 61, figs. 17–19; Journ. Roy. Micr. Soc., 1887, p. 907.—Wright, Ann. Mag. Nat. Hist., vol. 4, ser. 6, 1889, p. 449.—Pearcey, Trans. Glasgow Nat. Hist. Soc., vol. 2, 1890, p. 177.—Wright, Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 482; Irish Nat., vol. 9, No. 3, 1900, p. 54.—Heron-Allen and Earland, Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 255.

Description.—Test composed of a few chambers, each reaching well back from the preceding, thus forming a compact test, the test broadly rounded, the apertural end slightly extended, with a radiate aperture; sutures distinct; surface smooth.

Length up to 1.50 mm.

Distribution.—Such specimens are common in most of the oceans and may represent more than one species. It is recorded at numerous stations off the British Isles, and specimens referred to this species occur in the Caribbean.

NODOSARIA (GLANDULINA) LAEVIGATA D'Orbigny.

There are numerous records for this species from about the British Isles, but specimens are not figured. The specimens I have seen from European waters are more nearly like our variety *occidentalis* than like the typical form of d'Orbigny.

Some of the records are as follows: Shetland (Waller, Brady); Cumbrae (Robertson); southwest of Ireland (Wright) (Brady);[16] rare, Island of Skye (Robertson);[17] warm area, Faroe Channel (Pearcey);[18] off the southwest of Ireland (Wright);[19] very rare, Bognor, Sussex (Earland);[20] "very rare, but excellent and typical, west of Scotland" (Heron-Allen and Earland).[21]

NODOSARIA (GLANDULINA) LAEVIGATA D'Orbigny, var. OCCIDENTALIS, new variety.

Plate 12, fig. 8.

Nodosaria (Glandulina) laevigata PARKER and JONES, Philos. Trans., vol. 155, 1865, p. 340, pl. 13, fig. 1.

Description.—Variety differing from the typical in the shape of the test, this variety being more elongate, the chambers higher, sides at the base usually convex instead of concave or straight, sutures farther apart.

Distribution.—Type-specimen (U.S.N.M. Cat. No. 17811) from *Albatross* station D2003, in 641 fathoms (1,172 meters), off the northeastern coast of the United States. Specimens are fairly numerous at moderate depths from the latitude of Georges Bank southward to the general region of Cape Hatteras with a single station off Cuba.

This differs markedly from the following variety, more so than a verbal description can easily show.

There is a considerable difference in the microspheric and megalospheric forms, the latter having a much broader, rounded base with a short spine, the former much more pointed and the spine more developed.

Parker and Jones figure this variety in the reference given above, and note that it differs from the typical form of d'Orbigny. Their specimens were "from Nordland, in the Arctic Circle, at a depth of 160 fathoms (283 meters) . . . not uncommon, on a muddy bottom."

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[16] Journ. Roy. Micr. Soc., 1887, p. 907.

[17] Proc. Nat. Hist. Soc. Glasgow, pt. 3, 1889 (1892), p. 241.

[18] Trans. Glasgow Nat. Hist. Soc., vol. 2, 1890, p. 177.

[19] Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 482.

[20] Journ. Quekett Micr. Club, ser. 2, vol. 9, no. 57, 1905, p. 214.

[21] Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 255.

Nodosaria (Glandulina) laevigata, var. occidentalis—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
17811	U.S.N.M.	1	D2003....	37 16 30 N.; 74 20 36 W..	641	....	....	Few.
17862	U.S.N.M.	4						
17863	U.S.N.M.	2	D2018....	37 12 22 N.; 74 20 04 W..	788	39.0	bu. m.......	Rare.
17864	U.S.N.M.	3	D2084....	40 16 50 N.; 67 05 15 W..	1,290	40.0	bu. m., s....	Few.
17865	U.S.N.M.	7	D2112....	35 20 50 N.; 75 18 00 W..	16	73.5	s., blk. sp...	Frequent.
17866	U.S.N.M.	8	D2202....	39 38 00 N.; 71 39 45 W..	515	39.1	gn. m.......	Common.
17867	U.S.N.M.	1	D2203....	39 34 15 N.; 71 41 15 W..	705	38.9	gn. m., s....	Rare.
17868	U.S.N.M.	10+	D2212....	39 59 30 N.; 70 30 45 W..	428	40.0	gn. m.......	Abundant.
17869	U.S.N.M.	2	D2262....	39 54 45 N.; 69 29 45 W..	250	41.6	gn. m., s....	Rare.
17870	U.S.N.M.	1	D2339....	23 10 40 N.; 82 20 15 W..	191	....	co..........	Rare.
17871	U.S.N.M.	1	D2562....	39 15 30 N.; 71 25 00 W..	1,434	37.3	gy. oz.......	Rare.
17872	U.S.N.M.	1	D2568....	39 15 00 N.; 68 08 00 W..	1,781	36.9	gy. oz.......	Rare.
17873	U.S.N.M.	2	D2581....	39 43 00 N.; 71 34 00 W..	394	....	gn. m.......	Rare.
17874	U.S.N.M.	1	D2584....	39 05 30 N.; 72 23 20 W..	541	39.5	gy. m.......	Rare.
17875	U.S.N.M.	1	D2677....	32 39 00 N.; 76 50 30 W..	478	39.3	gn. m.......	Rare.
17876	U.S.N.M.	1	D2679....	32 40 00 N.; 76 40 30 W..	782	38.6	lt. gy. oz....	Rare.

NODOSARIA (GLANDULINA) LAEVIGATA D'Orbigny, var. TORRIDA, new variety.

Plate 12, fig. 10.

Nodosaria laevigata FLINT (not D'Orbigny), Rep. U. S. Nat. Mus., 1897 (1899), p. 308, pl. 55, fig. 3.

Description.—Variety differing from the typical in the more tumid form, shorter test and greater overlapping of the chambers.

Distribution.—Type-specimen (U.S.N.M. Cat. No. 17859) from *Albatross* station D2398, in 227 fathoms (416 meters), in the Gulf of Mexico. This very short, broad variety was found only in the warmer parts of the western Atlantic. It is the same as that figured by Flint and probably the same as those Goës had from stations in the Caribbean and Gulf of Mexico. Brady records *N. laevigata* from two *Challenger* stations off the West Indies, and it is probably this same variety.

Nodosaria (Glandulina) laevigata, var. torrida—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
17859	U.S.N.M.	1	D2396....	28 34 00 N.; 86 48 00 W..	335	....	gy. m.......	Rare.
17860	U.S.N.M.	1	D2398....	28 45 00 N.; 86 26 00 W..	227	48.6	gy. m.......	Rare.
17861	U.S.N.M.	1	D2677....	32 39 00 N.; 76 50 30 W..	478	39.3	gn. m.......	Rare.

NODOSARIA SUBANNULATA, new species.

Plate 12, fig. 9.

Nodosaria rotundata FLINT (not Reuss), Rep. U. S. Nat. Mus., 1897 (1899), p. 308, pl. 54, fig. 6.

Description.—Test composed of a few subglobular chambers somewhat overlapping, axis straight, initial end broadly rounded, sides somewhat lobulate; sutures distinct, slightly depressed; wall smooth, either glossy or dull; aperture terminal, central, radiate, very slightly raised above the broadly rounded surface of the test.

Length up to 3 mm.

Distribution.—Type-specimen (U.S.N.M. Cat. No. 17819) from *Albatross* station D2682, in 990 fathoms (1,811 meters), off the northeastern coast of the United States. It has occurred at a number of stations in this vicinity. From a study of the specimens from *Albatross* station D2112, it seems probable that some at least of Flint's specimens of *Nodosaria rotundata* are the young of this species. Some of the specimens figured by Parker and Jones as "*Nodosaria Radicula* Linn,"[22] from near the Arctic Circle at Nordland (Norway) in 160 fathoms (293 meters), are very close if not identical with our species.

It is fairly large and conspicuous, the last-formed chamber often very broadly, almost truncately rounded at the apertural end, the aperture itself hardly extending above the surface. Some of the specimens are quite glossy, while others are dull and have a matt surface. These may, with larger amounts of material, be found to be distinct as other characters seem to go with the difference in surface.

Nodosaria subannulata—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
17809	U.S.N.M.	3	D2003....	37 16 30 N.; 74 20 36 W..	641	....	....	Few.
17810	U.S.N.M.	2	D2018....	37 12 22 N.; 74 20 04 W..	788	39.0	bu. m.......	Rare.
3110	U.S.N.M.	1	D2043....	39 49 00 N.; 68 28 30 W..	1,467	38.5	glob. oz.....	Rare.
17812	U.S.N.M.	1	D2171....	37 59 30 N.; 73 48 40 W..	444	39.5	gn. m.......	Rare.
17813	U.S.N.M.	7	D2212....	39 59 30 N.; 70 30 45 W..	428	40.0	gn. m.......	Frequent.
17814	U.S.N.M.	5	D2213....	39 58 30 N.; 70 30 45 W..	384	39.5	gn. m.......	Frequent.
17815	U.S.N.M.	1	D2547....	39 54 30 N.; 70 20 00 W..	390	39.6	gn. m.......	Rare.
17816	U.S.N.M.	1	D2552....	39 47 07 N.; 70 35 00 W..	721	39.6	gy. oz.......	Rare.
17817	U.S.N.M.	5	D2581....	39 43 00 N.; 71 34 00 W..	394	....	gn. m.......	Frequent.
17818	U.S.N.M.	1	D2679....	32 40 00 N.; 76 49 30 W..	782	38.6	lt. gy. oz....	Rare.
17819	U.S.N.M.	1	D2682....	39 38 00 N.; 70 22 00 W..	990	....	gn. m.......	Frequent.
17820	U.S.N.M.	6						
17821	U.S.N.M.	1	D2689....	39 42 00 N.; 71 15 30 W..	525	....	gn. m.......	Rare.

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[22] Philos. Trans., vol. 155, 1865, pl. 13, figs. 2, 3, 6.

NODOSARIA CALOMORPHA Reuss.

Plate 12, fig. 13.

Nodosaria calomorpha Reuss, Denkschr. Akad. Wiss. Wien, vol. 25, 1865, p. 129, pl. 1, figs. 15–19.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 497, pl. 61, fig. 7.—Chaster, First. Rep. Southport Soc. Nat. Sci., 1890–1891 (1892), p. 63, pl. 1, fig. 12.—Wright, Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 482.—Egger, Abh. kön. bay. Akad. Wiss. München, Cl. II, vol. 18, 1893, p. 340, pl. 11, figs. 21, 26.—Goës, Kongl. Svensk. Vet. Akad. Handl., vol. 25, No. 9, 1894, p. 72, pl. 13, figs. 712, 713.—Morton, Proc. Portland Soc., vol. 2, 1897, p. 118, pl. 1, fig. 6.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 48, pl. 25, fig. 6.—Heron-Allen and Earland, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 91.—Pearcey, Trans. Roy. Soc. Edinb., vol. 49, 1914, p. 1021.—Heron-Allen and Earland, Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 256; Journ. Roy. Micr. Soc., 1916, p. 46.

Description.—Test elongate, usually somewhat arcuate, composed of a few elliptical chambers in adult specimens, three to five in number; wall smooth or occasionally with a few very delicate hispid spines; wall transparent, both ends broadly rounded, smooth; aperture a simple opening without neck.

Length 0.50—1 mm.

Distribution.—Brady recorded specimens under this name from three stations in deep water in the Atlantic; in the North Atlantic in 1,215 fathoms (2,222 meters), in the South Atlantic, in midocean in 1,990 and 2,220 fathoms (3,640 and 4,061 meters), and in very shallow water, 6 fathoms (11 meters), off the Falkland Islands. Egger records it off Western Africa; Pearcey records it from a station in 1,998 fathoms (3,654 meters) in the middle South Atlantic, and in 2¼ fathoms (4 meters), Stanley Harbor, Falkland Islands. It has been recorded a number of times off the coast of the British Isles, the deepest stations those given by Wright off the southwest of Ireland, very rare at 750 and 1,020 fathoms (1,370 and 1,866 meters). The only specimens that I have had which can be referred to this species are from an *Albatross* station south of Nantucket.

Nodosaria calomorpha—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
18775	U.S.N.M.	1	D2543....	° ′ ″ ° ′ ″ 39 58 15 N.; 70 42 30 W..	166	°F. 45.2	gn. s., bk. sp.	Rare.

NODOSARIA SIMPLEX Silvestri.

Plate 12, fig. 14; pl. 14, fig. 10.

Nodosaria simplex SILVESTRI, Atti Accad. Gioenia Sci. Nat., ser. 3, vol. 7, 1872, p. 95, pl. 11, figs. 268–272.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 496, pl. 62, figs. 4, 5, and 6?—EGGER, Abh. kön. bay. Akad. Wiss. München, Cl. II, vol. 18, 1893, p. 340, pl. 11, fig. 6.—FLINT, Rep. U. S. Nat. Mus., 1897 (1899), p. 309, pl. 55, fig. 2.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 49, pl. 28, fig. 5.

Description.—Test composed of two or more chambers, the initial chamber globular with a short spine at the base, the second pyriform with a well drawn out neck and radiate aperture; wall smooth; sutures well depressed.

Length about 1 mm.

Distribution.—Brady records two stations in the *Challenger* records for this species, one off Cape Hatteras and the other off the Canaries. Flint records it at an *Albatross* station very close to that of Brady, off Hatteras. I have it from a single station off the southern coast of Brazil. On the European coast the only records seem to be that of Pearcey,[23] as rare in the warm area of the Faroe Channel, and a very queer-looking specimen which Heron-Allen and Earland figure from the Clare Island region.[24] It does seem at all like the specimen I have had or the figures given by other authors.

Nodosaria simplex—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
18774	U.S.N.M.	1	D2763....	24° 17′ 00″ N.; 42° 48′ 30″ W..	671	°F. 37.9	br. glob.....	Rare.

NODOSARIA SUBANTENNULA, new name.

Nodosaria antennula CUSHMAN, Proc. U. S. Nat Mus., vol. 51, 1917, p. 653; Bull. 100, U. S. Nat. Mus, vol 4, 1921, p. 197, pl. 35, fig. 3.

The above name may be used for the species which I have described from the Philippine region in the reference given above. It is not the same as *Dentalina antennula* D'Orbigny, 1846.

NODOSARIA ATLANTICA, new species.

Plate 12, figs. 11, 12.

Description.—Test elongate, slightly tapering, arcuate, composed of a few inflated chambers, short; sutures of the early portion oblique, later ones less so, slightly depressed; wall smooth; aperture radiate, eccentric, very slightly extended.

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[23] Trans. Glasgow Nat. Hist. Soc., vol. 2, 1890, p. 178.

[24] Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 91, pl. 8, fig. 1.

Length up to 1 mm.

Distribution.—Type-specimen (U.S.N.M. Cat. No. 18779) from *Albatross* station D2756, in 417 fathoms (763 meters), off the coast of Brazil. It has also occurred at stations in the Gulf of Mexico and in the Caribbean..

This is a peculiar form in its very short chambered test, initial end broadly rounded, arcuate form, and the eccentric aperture. It is apparently limited to the warmer portion of the western Atlantic.

Nodosaria atlantica—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
18777	U.S.N.M.	2	D2150....	13 34 45 N.; 81 21 10 W..	382	45.8	wh. crs. s...	Rare.
18778	U.S.N.M.	1	D2400....	28 41 00 N.; 86 07 00 W..	169	....	gy. m.......	Rare.
18779	U.S.N.M.	1	D2756....	3 22 00 S.; 37 49 00 W..	417	40.5	gy. spk......	Rare.

NODOSARIA PYRULA D'Orbigny.

Plate 16, figs. 1–4.

"Orthoceras Monile" Soldani, Testaceographia, vol. 2, 1798, p. 35, pl. 10, figs. *b*, *c*.

Nodosaria pyrula D'Orbigny, Ann. Sci. Nat., vol. 7, 1826, p. 253, No. 13.—Williamson, Rec. Foram. Great Britain, 1858, p. 17, pl. 2, fig. 39.—Balkwill and Wright, Proc. Roy. Irish Acad., ser. 2, vol. 3, 1882, p. 548.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 497, pl. 62, figs. 10–12; Journ. Roy. Micr. Soc., 1887, p. 908.—Balkwill and Wright, Trans. Roy. Irish Acad., vol. 28, 1885, p. 343, pl. 12, fig. 23.—H. B. Brady, Parker, and Jones, Trans. Zool. Soc. London, vol. 12, 1888, p. 223, pl. 44, fig. 2.—Robertson, Proc. Nat. Hist. Soc. Glasgow, pt. 3, 1892, p. 241.—Egger, Abh. kön. bay. Akad. Wiss. München, Cl. II, vol. 18, 1893, p. 345, pl. 11, figs. 14, 15.—Woodward, The Observer, vol. 4, 1893, p. 143.—Chapman, Proc. Zool. Soc. London, pt. 1, 1895, p. 30.—Flint, Rep. U. S. Nat. Mus., 1897 (1899), p. 309, pl. 55, fig. 4.—Wright, Irish Nat., vol. 9, No. 3, 1900, p. 54.—Millett, Journ. Roy. Micr. Soc., 1902, p. 514.—Balkwill and Millett, Rec. Form. Galway, 1908, p. 6.—Chapman, Subantarctic Ids. New Zealand, 1909, p. 341.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 49, pl. 26, figs. 1–3.—Heron-Allen and Earland, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 92.—Chapman, Biol. Res. *Endeavour*, vol. 3, pt. 1, 1915, p. 23.—Heron-Allen and Earland, Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 256; Journ. Roy. Micr. Soc., 1916, p. 47.—Sidebottom, Journ. Roy. Micr. Soc., 1918, p. 132.—Cushman, Proc. U. S. Nat. Mus., vol. 56, 1919, p. 611; Bull. 100, U. S. Nat. Mus., vol. 4, 1921, p. 187, pl. 38, figs. 3–5.

Description.—Test elongate, very slender, composed of numerous chambers, either in a straight or slightly curved line, pyriform in shape with long tapering necks; surface smooth, chambers varying little in size; proloculum extended backward in a long-drawn-out point.

Length up to 8 mm.

Distribution.—There are numerous records for this species in the Atlantic. Those from the tropical western Atlantic are very close to the form found in the Philippine region, which has a large elongate, tapering proloculum. The right-hand specimen in Flint's figure shows this very well. The species is either a very widely distributed one or else has more than one form. In the *Albatross* collection specimens have occurred off the coast of Georgia, in the Gulf of Mexico, and in the Caribbean. Flint's specimens were from the northern part of the Gulf of Mexico. Goës also had it from several of the stations from which I have had it. One of the *Challenger* stations off the West Indies is given by Brady for this species as well as one off the Canary Islands. There are numerous reports of its occurrence off the coast of the British Isles.

Nodosaria pyrula—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
18753	U.S.N.M.	1	D2150....	13 34 45 N.; 81 21 10 W..	382	45.8	wh. crs. s....	Rare.
18754	U.S.N.M.	1	D2313....	32 53 00 N.; 77 53 00 W..	99	57.2	crs. s., bk. sp.	Rare.
18755	U.S.N.M.	2	D2314....	32 43 00 N.; 77 51 00 W..	159	47.4	crs. s., bk. sp.	Rare.
18756	U.S.N.M.	9	D2377....	29 07 30 N.; 88 08 00 W..	210	67.0	gy. m.......	Common.
18757	U.S.N.M.	1	D2400....	28 41 00 N.; 86 07 00 W..	169	....	gy. m.......	Rare.

NODOSARIA PYRULA D'Orbigny, var. SEMIRUGOSA D'Orbigny.

Plate 16, fig. 5.

Nodosaria semirugosa D'Orbigny, Foram. Foss. Vienne, 1846, p. 34, pl. 1, figs. 20–23.—Millett, Journ. Roy. Micr. Soc., 1902, p. 515, pl. 11, fig. 5.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 50, pl. 26, figs. 4–8.

Nodosaria No. 35, Von Schlicht, Foram. Septarienthones von Pietzpuhl, 1870, p. 24, pl. 7, fig. 20.

Nodosaria stipitata Reuss, var. *costulata* Reuss, Sitz. Akad. Wiss. Wien, vol. 62, Abth. 1, 1870, p. 471.

Nodosaria costulata H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 515, pl. 63, figs. 23–27.—Flint, Rep. U. S. Nat. Mus., 1897 (1899), p. 312, pl. 58, fig. 1.

Nodosaria pyrula D'Orbigny, var. *semirugosa* Cushman, Bull. 100, U. S. Nat. Mus., vol. 4, 1921, p. 187, pl. 33, figs. 6, 7.

Description.—Variety differing from the typical in having the basal portion of each chamber with several costae and alternating depressions, the upper end smooth.

Distribution.—The records given by Brady in the *Challenger* report for *Nodosaria costulata* from three stations in the Northern Atlantic, off Sombrero Island, 450 fathoms (823 meters), off Culebra Island, 390 fathoms (713 meters), and off Bermuda, 435 fathoms (796 meters). He also records it from one station in the Philippine Islands, 95 fathoms (174 meters). Flint's records for *Nodosaria costulata* are both in the northern part of the Gulf of Mexico. I have seen his material and it seems to be *Nodosaria pyrula*, var. *semirugosa.* I have also had material from the Gulf of Mexico and the Caribbean. It is recorded from the Malay Archipelago by Millett, and I have had it from off southern Japan as well as from numerous stations in the Philippine region. It usually occurs, as the records of Flint, Brady, and mine show, at depths of 100–500 fathoms (183–914 meters).

Nodosaria pyrula, var. semirugosa—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
17898	U.S.N.M.	1	D2378....	29 14 30 N.; 88 09 30 W..	68	....	gy. m.......	Rare.
17899	U.S.N.M.	1	D2385....	28 51 00 N.; 88 18 00 W..	730	40.1	gy. m.......	Rare.
17900	U.S.N.M.	1	D2395....	28 36 15 N.; 86 50 00 W..	347	44.1	gy. m.......	Rare.

NODOSARIA PYRULA D'Orbigny, variety.

At four *Albatross* stations, all in the general locality southeast of Nantucket, there are broken specimens of a variety of *Nodosaria pyrula* which have much more elongate chambers than the typical form from farther south.

Nodosaria pyrula, var.—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
18758	U.S.N.M.	2	D2247....	40 03 00 N.; 69 57 00 W..	67	52.4	gn. m., bk. sp.	Rare.
18759	U.S.N.M.	1	D2262....	39 54 45 N.; 69 29 45 W..	250	41.6	gn. m., s.....	Rare.
18760	U.S.N.M.	4	D2542....	40 00 15 N.; 70 42 20 W..	129	47.2	s., brk., sh...	Few.
18761	U.S.N.M.	1	D2552....	39 47 07 N.; 70 35 00 W..	721	39.6	gy. oz.......	Rare.

NODOSARIA FARCIMEN Soldani?

Plate 14, figs. 8, 11.

I have had a few specimens from stations in the Gulf of Mexico and in the Caribbean which are very similar to specimens figured by Brady in the *Challenger* report (pl. 62, figs. 17, 18) under this name. Flint records it off the coast of Carolina, in the Gulf of Mexico and the Caribbean, and Brady from off the West Indies and off the eastern coast of Brazil. The only records from the eastern Atlantic for *Nodosaria farcimen* seem to be those of Wright's from off the coast of Ireland. Wright and Pearcey both record *Nodosaria inflexa* Reuss: Wright as rare off the southwestern coast of Ireland, and Pearcey with a question mark as very rare in the warm area of the Faroe Channel. It was not found in any of the abundant material from the region from Cape Hatteras northward. Therefore it appears that we have here a species confined, as far as the western Atlantic shows, to tropical and subtropical waters.

Nodosaria farcimen?—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
17877	U.S.N.M.	2	D2144.....	9 49 00 N.; 79 31 30 W..	896	....	gn. m........	Rare.
17878	U.S.N.M.	2	D2396.....	28 34 00 N.; 86 48 00 W..	335	....	gy. m........	Rare.

NODOSARIA PAUPERATA (D'Orbigny).

Plate 14, fig. 13.

Dentalina pauperata D'Orbigny, Foram. Foss. Vienne, 1846, p. 46, pl. 1, figs. 57, 58.

Nodosaria (*Dentalina*) *pauperata* H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 500, fig. 14 (in text); Journ. Roy. Micr. Soc., 1887, p. 909.—Pearcey, Trans. Glasgow Nat. Hist. Soc., vol. 2, 1890, p. 178.—Robertson, Proc. Nat. Hist. Soc. Glasgow, pt. 3, 1892, p. 241.—Woodward, The Observer, vol. 4, 1893, p. 1.—Goës, Bull. Mus. Comp. Zoöl., vol. 29, 1896, p. 61.—Whiteaves, Geol. Survey Canada, 1901, p. 10.—Heron-Allen and Earland, Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 257.

There are, as will be seen by the above references, numerous records for this species in the Atlantic. Except those of Goës, they are all from the eastern Atlantic, off the coast of Europe. Goës records it from the Caribbean and the Gulf of Mexico, but the only specimens I have seen from the *Albatross* collections that are at all like figures of this species are rare specimens from off the northeastern coast of the United States.

Nodosaria pauperata—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
18769	U.S.N.M.	1	D2018.....	37 12 22 N.; 74 20 04 W..	788	39.0	bu. m.......	Rare.
18770	U.S.N.M.	1	D2029.....	39 42 00 N.; 70 47 00 W..	1,168	38.5	gy. m.......	Rare.
18771	U.S.N.M.	2	D2038.....	38 30 30 N.; 69 08 25 W..	2,033	....	glob. oz......	Rare.

NODOSARIA ABYSSORUM H. B. Brady.

The only record from the Atlantic for this species seems to be that of Egger, who records it from a single *Gazelle* station off western South Africa.[25]

NODOSARIA PROXIMA Silvestri?

Plate 15, fig. 3.

There are specimens from two *Albatross* stations off the northeastern coast of the United States which in general represent the figures given by Brady of this species. The only record given by Brady from the Atlantic was off the Azores. Pearcey records it from Burdwood Bank in 56 fathoms (102 meters), and Heron-Allen and Earland record a single specimen from off South Cornwall[26] and as rare off the west of Scotland.[27]

Nodosaria proxima?—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
17879	U.S.N.M.	1	D2192	39° 46′ 30″ N.; 70° 14′ 45″ W.	1,060	38.6	gy. oz	Rare.
17880	U.S.N.M.	1	D2262	39° 54′ 45″ N.; 69° 29′ 45″ W.	250	41.6	gn. m., s.	Rare.

NODOSARIA RADICULA (Linnaeus).

"Cornu Hammonis erectum" Plancus, Conch. Min., 1739, p. 14, pl. 1, fig. 5.

Nautilus radicula Linnaeus, Syst. Nat., ed. 12, 1767, p. 1164, 285; (Gmelin's) ed. 13, 1788, vol. 1, pt. 6, p. 3373, No. 18.—Montagu, Test. Brit., 1803, p. 197, pl. 6, fig. 4.

Nodosaria radicula D'Orbigny, Ann. Sci. Nat., vol. 7, 1826, p. 252, No. 3; Modèles, No. 1.—Goës, Kongl. Svensk. Vet. Akad. Handl., vol. 19, No. 4, 1882, p. 10.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 495, pl. 61, figs. 28–31.—Balkwill and Wright, Trans. Roy. Irish Acad., vol. 28, 1885, p. 342.—H. B. Brady, Journ. Roy. Micr. Soc., 1887, p. 908.—Goës, Bull. Mus. Comp. Zoöl., vol. 29, 1896, p. 60.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 52.—Heron-Allen and Earland, Journ. Roy. Micr. Soc., 1916, p. 46.

Description.—Test elongate, straight, composed of a few subglobular chambers, more or less separated from one another, the initial end usually with a spine, apertural end slightly truncate with a radiate aperture; wall smooth.

Length about 2 mm.

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[25] Abh. kön. bay. Akad. Wiss. München, Cl. II, vol. 18, 1893, p. 342, pl. 11, fig. 11.

[26] Journ. Roy. Micr. Soc., 1916, p. 47.

[27] Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 258.

Distribution.—Specimens of this species were recorded from numerous stations off the British Isles. Goës recorded it from the Caribbean, but, so far as I have seen, specimens from the western Atlantic should be referred elsewhere.

NODOSARIA SUBSOLUTA, new species.

Plate 13, fig. 1.

Nodosaria soluta H. B. Brady (not *Dentalina soluta* Reuss), Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 503, pl. 62, figs. 13–16; pl. 64, fig. 28.—Goës, Kongl. Svensk. Vet. Akad. Handl., vol. 25, No. 9, 1894, p. 70, pl. 12, fig. 690; Bull. Mus. Comp. Zoöl., vol. 29, 1896, p. 62.—Flint, Rep. U. S. Nat. Mus., 1897 (1899), p. 310, pl. 56, fig. 3.—Cushman, Bull. 71, U. S. Nat. Mus., 1913, p. 53, pl. 26, figs. 9–11; Bull. 100, U. S. Nat. Mus., vol. 4, 1921, p. 192, pl. 34, figs. 5, 6.

Description.—Test elongate, tapering, somewhat arcuate, rather stout, initial chamber usually large with a single short basal spine; chambers few, subglobular or slightly pyriform; sutures distinct; wall smooth except for the basal third of each chamber, which is typically very finely costate with numerous very fine, often interrupted costae, which in some specimens are almost spines; apertural end slightly produced, aperture radiate.

Length up to 7 mm.

Distribution.—Type-specimen (U.S.N.M. Cat. No. 17772) from *Albatross* station D2751, in 687 fathoms (1,255 meters), off the coast of Brazil. It has also occurred at numerous stations in the *Albatross* collections from about 40° N. latitude off the northeastern coast of the United States southward into the Gulf of Mexico and Caribbean and off the coast of Brazil. This is the same range as found by Flint. Brady records it as "not uncommon in the North Atlantic, at depths ranging from 300 to 900 fathoms (549 to 1,646 meters), and has been found as low as 1,360 fathoms (2,487 meters)." He records it from the South Atlantic from 350 to 675 fathoms (640 to 1,234 meters). He also records it from the South Pacific. I have had the same species from the Philippine region in comparatively deep water.

Nodosaria soluta is recorded by Wright[28] from 1,000 fathoms (1,829 meters), and off the southwest coast of Ireland in 750 fathoms (1,370 meters).[29] Pearcey[30] records it as common in the warm area of the Faroe Channel. Earland records it as very rare off Bognor.[31] Heron-Allen and Earland[32] figure a minute specimen from the Clare Island region, but it, as they note, is not at all the typical form of the species (pl. 13, fig. 2).

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[28] Ann. Mag. Nat. Hist., vol. 4, ser. 6, 1889, p. 449.

[29] Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 483.

[30] Trans. Glasgow Nat. Hist. Soc., vol. 2, 1890, p. 178.

[31] Journ. Quekett. Micr. Club, ser. 2, vol. 9, no. 57, 1905, p. 215.

[32] Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 92, pl. 8, fig. 2.

Nodosaria subsoluta—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°*F.*		
17750	U.S.N.M.	2	D2018....	37 12 22 N.; 74 20 04 W..	788	39.0	bu. m.......	Rare.
17751	U.S.N.M.	1	D2035....	39 26 16 N.; 70 02 37 W..	1,362	....	glob. oz.....	Rare.
17752	U.S.N.M.	2	D2038....	38 30 30 N.; 69 08 25 W..	2,035	....	glob. oz.....	Rare.
17753	U.S.N.M.	1	D2039....	38 19 26 N.; 68 20 20 W..	2,369	....	glob. oz.....	Rare.
17754	U.S.N.M.	1	D2043....	39 49 00 N.; 68 28 30 W..	1,467	38.5	glob. oz.....	Rare.
17755	U.S.N.M.	3	D2052....	39 40 05 N.; 69 21 25 W..	1,098	45.0	glob. oz.....	Few.
3140	U.S.N.M.	1	D2084....	40 16 50 N.; 67 05 15 W..	1,290	40.0	bu. m., s....	Rare.
17757	U.S.N.M.	1	D2097....	37 56 20 N.; 70 57 30 W..	1,917	....	glob. oz.....	Rare.
17758	U.S.N.M.	1	D2105....	37 50 00 N.; 73 03 50 W..	1,395	41.0	glob. oz.....	Rare.
17759	U.S.N.M.	1	D2140....	17 36 10 N.; 76 46 05 W..	966	39.7	s............	Rare.
17760	U.S.N.M.	1	D2226....	37 00 00 N.; 71 54 00 W..	2,045	36.8	glob. oz.....	Rare.
17761	U.S.N.M.	3	D2385....	28 51 00 N.; 88 18 00 W..	730	40.1	gy. m.......	Few.
17762	U.S.N.M.	1	D2393....	28 43 00 N.; 87 14 30 W..	525	41.1	lt. gy. m....	Rare.
3086	U.S.N.M.	1	D2535....	40 03 30 N.; 67 27 15 W..	1,149	37.8	gy. oz.......	Rare.
17763	U.S.N.M.	4	D2547....	39 54 30 N.; 70 20 00 W..	390	39.6	gn. m.......	Few.
17764	U.S.N.M.	2	D2568....	39 15 00 N.; 68 08 00 W..	1,781	36.9	gy. oz.......	Rare.
17765	U.S.N.M.	1	D2581....	39 43 00 N.; 71 34 00 W..	394	....	gn. m.......	Rare.
17766	U.S.N.M.	1	D2644....	25 40 00 N.; 80 00 00 W..	193	43.4	gy. s........	Rare.
17767	U.S.N.M.	5	D2677....	32 39 00 N.; 76 50 30 W..	478	39.3	gn. m.......	Few.
17768	U.S.N.M.	1	D2678....	32 40 00 N.; 76 40 30 W..	731	38.7	lt. gy. oz....	Rare.
17769	U.S.N.M.	1	D2679....	32 40 00 N.; 76 40 30 W..	782	38.6	lt. gy. oz....	Rare.
17770	U.S.N.M.	1	D2680....	39 50 00 N.; 70 26 00 W..	555	....	....	Rare.
17771	U.S.N.M.	10+	D2682....	39 38 00 N.; 70 22 00 W..	990	....	gn. m.......	Abundant.
17772	U.S.N.M.	1	D2751....	16 54 00 N.; 63 12 00 W..	687	40.0	bu. glob. oz.	Rare.
17773	U.S.N.M.	1						
17774	U.S.N.M.	1	D2754....	11 40 00 N.; 58 33 00 W..	880	38.0	glob. oz.....	Rare.
17775	U.S.N.M.	4	D2760....	12 07 00 S.; 37 17 00 W..	1,019	39.5	br. co.......	Few.

NODOSARIA COMMUNIS D'Orbigny.

Plate 12, figs. 3, 4, 15–17.

Nodosaria (*Dentalina*) *communis* D'ORBIGNY, Ann. Sci. Nat., vol. 7, 1826, p. 254, No. 35.

Nodosaria communis REUSS, Verstein Böhm. Kreide, pt. 1, 1845, p. 28, pl. 12, fig. 21.—PARKER and JONES, Philos. Trans., vol. 155, 1865, p. 342, pl. 13, fig. 10.—GOËS, Kongl. Svensk. Vet. Akad. Handl., vol. 19, No. 4, 1882, p. 26, pl. 1, figs. 11–16.—BALKWILL and WRIGHT, Proc. Roy. Irish Acad., ser. 2, vol. 3, 1882, p. 548.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 504, pl. 62, figs. 19–22.—BALKWILL and WRIGHT, Trans. Roy. Irish Acad., vol. 28, 1885, p. 343.—H. B. BRADY, Journ. Roy. Micr. Soc., 1887, p. 908.—WRIGHT, Ann. Mag. Nat. Hist., vol. 4, ser. 6, 1889, p. 449.—PEARCEY, Trans. Glasgow Nat. Hist. Soc., vol. 2, 1890, p. 178.—WRIGHT, Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 483.—ROBERTSON, Proc. Nat. Hist. Soc. Glasgow, pt. 3, 1892, p. 241.—WOODWARD, The Observer, vol. 4, 1893, p. 148.—EGGER, Abh. kön. bay. Akad. Wiss. München, Cl. II, 1893, p. 342, pl. 11, figs. 22–24.—GOËS, Bull. Mus. Comp. Zoöl., vol. 29, 1896, p. 61, pl. 6, fig. 1.—FLINT, Rep. U. S. Nat. Mus., 1897 (1899), p. 310, pl. 56, fig. 2.—WRIGHT, Irish Nat., vol. 9, No. 3, 1900, p. 54.—WHITEAVES, Geol. Survey Canada, 1901, p. 10.—EARLAND, Jour. Quekett Micr. Club, ser. 2, vol. 9, No. 57, 1905, p. 215.—BALKWILL and MILLETT, Rec. Foram. Galway, 1908, p. 6.—HERON-ALLEN and EARLAND, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 92; Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 256; Journ. Roy. Micr. Soc., 1916, p. 47.

For convenience of future workers on this genus I have included in the synonymy many of the references to this species. It is obvious that several things have been included under this name and it is also questionable whether any of them are really identical with D'Orbigny's Cretaceous species. A study of this group with material from various oceans should be made to determine the distribution of the various species.

Nodosaria communis.—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°*F.*		
17829	U.S.N.M.	2	D2117....	15 24 20 N.; 63 31 30 W..	683	39.8	yl. m., fne. s.	Rare.
17830	U.S.N.M.	1	D2144....	9 49 00 N.; 79 31 30 W..	896	....	gn. m.......	Rare.
17831	U.S.N.M.	8	D2150....	13 34 45 N.; 81 21 10 W..	382	45.8	wh. crs. s....	Common.
17832	U.S.N.M.	2	D2352....	22 35 00 N.; 84 23 00 W..	463	45.0	wh. co......	Rare.
17833	U.S.N.M.	4	D2377....	29 07 30 N.; 88 08 00 W..	210	67.0	gy. m.......	Few.
17834	U.S.N.M.	1	D2395....	28 36 15 N.; 86 50 00 W..	347	44.1	gy. m.......	Rare.
17835	U.S.N.M.	1	D2396....	28 34 00 N.; 86 48 00 W..	335	....	gy. m.......	Rare.
17836	U.S.N.M.	3	D2400....	28 41 00 N.; 86 07 00 W..	169	....	gy. m.......	Few.
17837	U.S.N.M.	1	D2416....	31 26 00 N.; 79 07 00 W..	276	53.8	co., brk. sh..	Rare.
17838	U.S.N.M.	1	D2485....	41 49 00 N.; 65 49 30 W..	72	43.6	s., brk., sh..	Rare.
17839	U.S.N.M.	1	D2555....	39 53 00 N.; 71 32 00 W..	136	47.7	gn. m., s....	Rare.
17840	U.S.N.M.	1	D2668....	30 58 30 N.; 79 38 30 W..	294	46.3	gy. s........	Rare.
17841	U.S.N.M.	1	D2677....	32 39 00 N.; 76 50 30 W..	478	39.3	gn. m.......	Rare.
17842	U.S.N.M.	7	D2679....	32 40 00 N.; 76 40 30 W..	782	38.6	lt. gy. oz....	Frequent.

NODOSARIA FILIFORMIS D'Orbigny.

Plate 12, figs. 1, 2.

"Orthoceratia filiformia aut capillaria" SOLDANI, Testaceographia, vol. 2, 1798, p. 35, pl. 10, fig. *e*.

Nodosaria filiformis D'ORBIGNY, Ann. Sci. Nat., vol. 7, 1826, p. 253, No. 14.—EGGER, Abh. Kön. bay. Akad. Wiss., München, Cl. II, vol. 18, 1893, p. 340, pl. 11, fig. 4.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 500, pl. 63, figs. 3–5.—CHAPMAN, Proc. Zool. Soc. London, pt. 1, 1895, p. 30.—FLINT, Rep. U. S. Nat. Mus., 1897 (1899), p. 310, pl. 55, fig. 6.—MORTON, Proc. Portland Soc., vol. 2, 1897, p. 119.—MILLETT, Journ. Roy. Micr. Soc., 1902, p. 523.—CHAPMAN, The Foraminifera, 1902, p. 402; Trans. N. Zealand Inst., vol. 38, 1905, p. 93, pl. 3, fig. 5.—GODDARD, Rec. Austr. Mus., vol. 6, 1907, p. 308.—HERON-ALLEN and EARLAND, Journ. Roy. Micr. Soc., 1909, p. 427.—CHAPMAN, Journ. Linn. Soc. Zool., vol. 30, 1910, p. 412.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 55, pl. 27, figs. 1–4.—HERON-ALLEN and EARLAND, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 92.—PEARCEY, Trans. Roy. Soc. Edinb., vol. 49, 1914, p. 1022.—HERON-ALLEN and EARLAND, Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 256.—MESTAYER, Trans. N. Zealand Inst., vol. 48, 1916, p. 129.—SIDEBOTTOM, Journ. Roy. Micr. Soc., 1918, p. 133.—CUSHMAN, Proc. U. S. Nat. Mus., vol. 56, 1919, p. 612; Bull. 100, U. S. Nat. Mus., vol. 4, 1921, p. 194, pl. 34, fig. 9.

Description.—Test elongate, slender, arcuate; chambers numerous, elliptical or ovate, elongate, tumid; sutures usually oblique, chambers increasing in length toward the apertural end; aperture radiate, slightly eccentric; wall smooth.

Length up to 7 mm.

Distribution.—The Atlantic records given by Brady for this species include two stations off the West Indies; off Culebra Island, 390 fathoms (713 meters), off Sombrero Island, 450 fathoms (823 meters), and also off Bermuda, 435 fathoms (796 meters). He also records it from off the mouth of the Rio La Plata and off the Canary Islands. Flint's specimens were from the northern part of the Gulf of Mexico. I have had specimens in the *Albatross* collections from the region of Cape Hatteras southward, off the coast of Florida and in the Gulf of Mexico. Although it is recorded from the British Isles, records are few and evidently specimens are very rare. Whether these are the same as the large species found in the western tropical Atlantic it seems open to question. There are numerous records for it in various parts of the Indo-Pacific. There is also a decided question as to whether or not our recent western Atlantic species is really identical with that described by D'Orbigny from the Tertiary of Italy.

Nodosaria filiformis—Material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
17881	U.S.N.M.	2	D2109....	35 14 20 N.; 74 59 10 W..	142	50.5	bu. m.......	Rare.
17882	U.S.N.M.	2	D2378....	29 14 30 N.; 88 09 30 W..	68	....	gy. m.......	Rare.
17883	U.S.N.M.	1	D2395....	28 36 15 N.; 86 50 00 W..	347	44.1	gy. m.......	Rare.
17884	U.S.N.M.	4	D2399....	28 44 00 N.; 86 18 00 W..	196	51.6	gy. m.......	Few.
17885	U.S.N.M.	1	D2614....	34 09 00 N.; 76 02 00 W..	168	....	gy.,s. bk. sp.	Rare.
17886	U.S.N.M.	1	D2639....	25 04 50 N.; 80 15 10 W..	56	....	co. s.........	Rare.
17887	U.S.N.M.	2	D2641....	25 11 30 N.; 80 10 00 W..	60	69.2	co. s.........	Rare.

NODOSARIA CONSOBRINA (D'Orbigny).

There are a few records, especially from the British Isles, under this name. It is recorded by Balkwill and Wright[33] as very rare off Dublin and Wicklow, and again at a few stations in the same region.[34] Brady[35] adds a record from the Durham coast, and Robertson[36] records it as rare, off the Island of Skye. Wright[37] gives it as very rare at 7-1020 fathoms (13-1866 meters), off the southwest of Ireland. The only record given by Heron-Allen and Earland is off the west of Scotland, but specimens were not common.[38] I have failed to find specimens in the western Atlantic material which could be referred to this species.

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[33] Proc. Roy. Irish Acad., ser. 2, vol. 3, 1882, p. 548.

[34] Trans. Roy. Irish Acad., vol. 28, 1885, p. 343.

[35] Journ. Roy. Micr. Soc., 1887, p. 908.

[36] Proc. Nat. Hist. Soc., Glasgow, pt. 3, 1892, p. 241.

[37] Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 483.

[38] Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 256.

NODOSARIA CONSOBRINA D'Orbigny, var. EMACIATA Reuss.

Plate 13, figs. 3-5.

Brady figures under this name an elongate somewhat curved *Nodosaria* which does not seem so strikingly like Reuss's original figure of *Dentalina emaciata*, as do the specimens referred to *Dentalina intermedia* by Hantken. Whether the recent specimens are the same as the fossil ones of Europe must be left until a study of the latter can be made. Of the Atlantic *Challenger* records two occur in the western Atlantic, one off the West Indies, the other off Bermuda. Flint's specimens of this variety[39] were from the northern part of the Gulf of Mexico. I have had the species from stations in the same region, and also, as occurs with many other species, specimens from as far north on the southeastern Atlantic coast of the United States as latitude 34°. From these records of the *Challenger* and *Albatross* dredgings, therefore, there seems to be developed a species of the form figured by Brady and Flint and which I have again figured here, which is, so far as the material I have examined shows, confined to the western tropical and subtropical Atlantic. On the eastern side of the Atlantic there are records under this name by Pearcey as rare in the warm area of the Faroe Channel,[40] and by Wright from off the southwest of Ireland, rare, at 345 fathoms (631 meters).[41] This variety, however, does not seem to be mentioned in the works on the general region of the British Isles in the last 30 years.

Nodosaria consobrina, var. emaciata—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
18762	U.S.N.M.	1	D2312....	32 54 00 N.; 77 53 30 W..	88	57.8	crs. s., bk. sp	Rare.
18763	U.S.N.M.	1	D2313....	32 53 00 N.; 77 53 00 W..	99	57.2	crs. s., bk. sp	Rare.
18764	U.S.N.M.	1	D2377....	29 07 30 N.; 88 08 00 W..	210	67.0	gy. m.......	Rare.
18765	U.S.N.M.	1	D2396....	28 34 00 N.; 86 48 00 W..	335	....	gy. m.......	Rare.
18766	U.S.N.M.	5	D2399....	28 44 00 N.; 86 18 00 W..	196	51.6	gy. m.......	Frequent.
18767	U.S.N.M.	5	D2400....	28 41 00 N.; 86 07 00 W..	169	....	gy. m.......	Frequent.
18768	U.S.N.M.	4	D2415....	30 44 00 N.; 79 26 00 W..	440	45.6	co., crs. s....	Few.

NODOSARIA AEQUALIS Reuss.

Under this name Brady has a *Challenger* record from the Atlantic from off the West Indies, and also off the Rio La Plata. Goës records it from off the Azores, off the coasts of Norway and Sweden, and from the Arctic. Pearcey records it from the Faroe Channel. I have not seen the species from the western Atlantic.

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[39] Rep. U. S. Nat. Mus., 1897 (1899), p. 310, pl. 56, fig. 1.
[40] Trans. Glasgow Nat. Hist., vol. 2, 1890, p. 178.
[41] Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 483.

NODOSARIA ADVENA, new species.

Plate 14, fig. 12.

Nodosaria (Dentalina) roemeri H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 505, pl. 63, fig. 1.—FLINT, Rep. U. S. Nat. Mus., 1897 (1899), p. 310, pl. 56, fig. 5.

Description.—Test elongate, only slightly tapering, circular in transverse section, composed of few chambers, initial end broadly rounded, apertural end slightly drawn out; sutures oblique, distinct, slightly depressed; wall smooth; aperture radiate, eccentric.

Length up to 7 mm.

Distribution.—Type-specimen (U.S.N.M. Cat. No. 17856) from *Albatross* station D2689, in 525 fathoms (960 meters), off the northeastern coast of the United States. Specimens of this general character occur at numerous *Albatross* stations off the eastern coast of the United States, in the Gulf of Mexico, and in the Caribbean. Flint's specimens referred to in the synonymy were from off the northeastern coast of the United States, and off the Bahamas. In the *Challenger* report Brady gives the following sentence in regard to its distribution: "It has been observed chiefly in the North Atlantic at depths of less than 400 fathoms (732 meters). In the volume on the Summary of Results it is recorded from off the West Indies, off Sombrero and Culebra Islands, 450 and 390 fathoms (823 and 713 meters), off Bermuda, 435 fathoms (796 meters), and off the Canaries.

It is evidently not the same as *N. roemeri* Neugeboren and is not the same as Reuss's *N. roemeri*, being more like his figure referred to *Cristellaria tenuis* Bornemann,[42] which is not like Bornemann's original figure at all.

Heron-Allen and Earland record *N. roemeri* (pl. 13, fig. 6) as very rare west of Scotland, and Pearcey had questionable rare material from the cold area of the Faroe Channel. Pearcey also records specimens from Burdwood Bank, 1,946 and 56 fathoms (3,559 and 102 meters), material which may be the same as *N. advena*.

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[42] Foram. Pietzpuhl, 1870, pl. 10, fig. 16.

Nodosaria advena—*material examined.*

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
17843	U.S.N.M.	2	D2144....	9 49 00 N.; 79 31 30 W..	896	....	gn. m.......	Rare.
17844	U.S.N.M.	1	D2160....	23 10 31 N.; 82 20 37 W..	167	....	co............	Rare.
17845	U.S.N.M.	1	D2171....	37 59 30 N.; 73 48 40 W..	444	39.5	gn. m.......	Rare.
17846	U.S.N.M.	2	D2203....	39 34 15 N.; 71 41 15 W..	705	38.9	gn. m., s....	Rare.
17847	U.S.N.M.	1	D2217....	39 47 20 N.; 69 34 15 W..	924	38.1	gy. m.......	Rare.
17848	U.S.N.M.	1	D2313....	32 53 00 N.; 77 53 00 W..	99	57.2	crs. s., bk. sp	Rare.
17849	U.S.N.M.	1	D2355....	20 56 48 N.; 86 27 00 W..	399	....	yl. oz.......	Rare.
17850	U.S.N.M.	2	D2385....	28 51 00 N.; 88 18 00 W..	730	40.1	gy. m.......	Rare.
17851	U.S.N.M.	1	D2562....	39 15 30 N.; 71 25 00 W..	1,434	37.3	gy. oz.......	Rare.
17852	U.S.N.M.	1	D2563....	39 18 30 N.; 71 23 30 W..	1,422	37.4	gy. oz.......	Rare.
17853	U.S.N.M.	1	D2575....	41 07 00 N.; 65 26 30 W..	1,710	37.1	gy. oz.......	Rare.
17854	U.S.N.M.	1	D2678....	32 40 00 N.; 76 40 30 W..	731	38.7	lt. gy. oz....	Rare.
17855	U.S.N.M.	2	D2682....	39 38 00 N.; 70 22 00 W..	990	....	gn. m.......	Rare.
17856	U.S.N.M.	1	D2680....	39 42 00 N.; 71 15 30 W..	525	....	gn. m.......	Rare.
17857	U.S.N.M.	1	....	....	....	....	....	
17858	U.S.N.M.	1	H80......	12 07 30 N.; 62 24 00 W..	1,552	....	bu. m. for...	Rare.

NODOSARIA MUCRONATA (Neugeboren).

Plate 12, figs. 5–7; pl. 13, figs. 7–9.

"Orthoceras intortum" Soldani, Testaceographia, vol. 1, pt. 2, 1791, p. 98, pl. 105, fig. v.

Nodosaria (*Dentalina*) *obliqua* D'Orbigny (not Linnaeus), Ann. Sci. Nat., vol. 7, 1826, p. 254, No. 36; Modèles, No. 5.

Dentalina mucronata Neugeboren, Denkschr. Akad. Wiss. Wien, vol. 12, 1856, p. 83, pl. 3, figs. 8–11.

Nodosaria mucronata Reuss, Sitz. Akad. Wiss. Wien, vol. 62, 1870, p. 475, No. 30.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 506, pl. 62, figs. 27–31.—H. B. Brady, Parker, and Jones, Trans. Zool. Soc. London, vol. 12, 1888, p. 223, pl. 44, fig. 10.—Wright, Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 488.—Egger, Abh. kön. bay. Akad. Wiss. München, Cl. II, vol. 18, 1893, p. 342.—Flint, Rep. U. S. Nat. Mus., 1897 (1899), p. 311, pl. 57, fig. 2.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 56, pl. 24, fig. 3; pl. 25, fig. 2; pl. 27, figs. 5–7; pl. 35, fig. 6.—Heron-Allen and Earland, Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 257 [?].

Description.—Test elongate, tapering from the acute initial end to the broadest portion, that of the last-formed chamber, initial end often with a short spine; chambers comparatively few, not inflated; sutures distinct, oblique but not depressed; wall smooth; aperture radiate, eccentric.

Length up to 5 mm.

Distribution.—Specimens referred to this species occurred from the coast of Carolina northward to the Grand Banks and a single station above 50° N. latitude. There is a single station in the Caribbean. Flint records it from one station in the Gulf of Mexico. Brady's Atlantic records include one off New York and another off Bermuda. Parker, Jones, and H. B. Brady record it from the

Abrohlos Bank off Brazil. Records from Eastern Europe are very few. Wright records it off the southwest of Ireland, very rare at 7, 345, and 1,020 fathoms (13, 618, and 1,866 meters), and Heron-Allen and Earland record a single doubtful specimen west of Scotland.

This is another of the species which needs careful revision with abundant material from widely distributed localities.

Nodosaria mucronata—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
17724	U.S.N.M.	4	D2018....	37 12 22 N.; 74 20 04 W..	788	39.0	bu. m.......	Few.
17725	U.S.N.M.	1	D2037....	38 53 00 N.; 69 23 30 W..	1,731	38.0	glob. oz......	Rare.
17726	U.S.N.M.	2	D2038....	38 30 30 N.; 69 08 25 W..	2,033	....	glob. oz......	Rare.
17727	U.S.N.M.	2	D2039....	38 19 26 N.; 68 20 20 W..	2,369	....	glob. oz......	Rare.
17728	U.S.N.M.	10	D2041....	39 22 50 N.; 68 25 00 W..	1,608	38.0	glob. oz......	Common.
17729	U.S.N.M.	4	D2042....	39 33 00 N.; 68 26 45 W..	1,555	38.5	glob. oz......	Few.
17730	U.S.N.M.	1	D2112....	35 20 50 N.; 75 18 00 W..	16	73.5	s., blk. sp....	Rare.
17731	U.S.N.M.	3	D2203....	39 34 15 N.; 71 41 15 W..	705	38.9	gn. m., s.....	Few.
17732	U.S.N.M.	5	D2453....	47 10 00 N.; 51 02 00 W..	82	29.7	gn. m., fne. s.	Frequent.
17733	U.S.N.M.	5	D2458....	46 48 30 N.; 52 34 00 W..	89	29.5	s., gn. m.....	Frequent.
17734	U.S.N.M.	1	D2568....	39 15 00 N.; 68 08 00 W..	1,781	36.9	gy. oz........	Rare.
17735	U.S.N.M.	1	D2677....	32 39 00 N.; 76 50 30 W..	478	39.3	gn. m.........	Rare.
17736	U.S.N.M.	2	D2679....	32 40 00 N.; 76 40 30 W..	782	38.6	lt. gy. oz.....	Rare.
17737	U.S.N.M.	1	D2682....	39 38 00 N.; 70 22 00 W..	990	....	gn. m.........	Rare.
17738	U.S.N.M.	1	D2696....	46 50 30 N.; 45 05 30 W..	98	....	gn. m.........	Rare.
17739	U.S.N.M.	1	D2710....	40 06 00 N.; 68 01 00 W..	984	....	gn. m.........	Rare.
17740	U.S.N.M.	1	D2751....	16 54 00 N.; 63 12 00 W..	687	40.0	bu. glob. oz..	Rare.

NODOSARIA SCALARIS (Batsch).

"Orthoceratia Flosculi" SOLDANI, Testaceographia, vol. 1, pt. 2, 1791, p. 91, pl. 95, figs. B–M.

Nautilus (*Orthoceras*) *scalaris* BATSCH, Conch. des Seesandes, 1791, No. 4, pl. 2, figs. 4*a*, *b*.

Nodosaria scalaris PARKER and JONES, Philos. Trans., vol. 155, 1865, p. 340, pl. 16, figs. 2 *a–c*.—PARKER, JONES, and H. B. BRADY, Ann. Mag. Nat. Hist., ser. 4, vol. 8, 1871, p. 157, pl. 9, fig. 42.—BALKWILL and WRIGHT, Proc. Roy. Irish Acad., ser. 2, vol. 3, 1882, p. 548.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 510, pl. 9, fig. 42.—BALKWILL and WRIGHT, Trans. Roy. Irish Acad., vol. 28, 1885, p. 342.—H. B. BRADY, Journ. Roy. Micr. Soc., 1887, p. 909.—H. B. BRADY, PARKER, and JONES, Trans. Zool. Soc. London, vol. 12, 1888, p. 223, pl. 44, figs. 6, 19.—WRIGHT, Ann. Mag. Nat. Hist., vol. 4, ser. 6, 1889, p. 449.—PEARCEY, Trans. Glasgow Nat. Hist. Soc., vol. 2, 1890, p. 178.—WRIGHT, Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 483.—ROBERTSON, Proc. Nat. Hist. Soc. Glasgow, pt. 3, 1892, p. 241.—EGGER, Abh. kön. bay. Akad. Wiss. München, Cl. II, vol. 18, 1893, p. 344, pl. 11, figs. 40, 41.—GOËS, Kongl. Svensk. Vet. Akad. Handl., vol. 25, No. 9, 1894, p. 73, pl. 13, figs. 716–718.—CHAPMAN, Proc. Zool. Soc. London, pt. 1, 1895, p. 32.—GOËS, Bull. Mus. Comp. Zoöl., vol. 29, 1896, p. 60.—WRIGHT, Irish Nat., vol. 9, No. 3, 1900, p. 54.—CHAPMAN, The Foraminifera, 1902, p. 402.—MILLETT, Journ. Roy. Micr. Soc., 1902, p. 520, pl. 11, fig. 2.—EARLAND, Journ. Quekett Micr. Club, ser. 2, vol. 9, No. 57, 1905, p. 215.—CHAPMAN, Journ. Quekett Micr. Club, ser. 2, vol. 10, 1907, p. 129.—Goddard, Rec. Austr. Mus., vol. 6, 1907, p. 308.—Balkwill and Millett, Rec. Foram. Galway, 1908, p. 6.—Sidebottom, Mem. Proc. Manchester Lit. Philos. Soc., vol. 54, No. 16, 1910, p. 20, pl. 2, figs. 19–21.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 58, pl. 24, fig. 7.—Heron-Allen and Earland, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 93; Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 257; Journ. Roy. Micr. Soc., 1916, p. 47.—Sidebottom, Journ. Roy. Micr. Soc., 1918, p. 134.—Cushman, Proc. U. S. Nat. Mus., vol. 56, 1919, p. 613; Bull. 100, U. S. Nat. Mus., vol. 4, 1921, p. 199, pl. 35, fig. 6.

Nodosaria longicauda D'Orbigny, Ann. Sci. Nat., vol. 7, 1826, p. 254, No. 28.

Description.—Test composed of few nearly spherical chambers, rapidly increasing in size as added, apical end often with a spine, surface ornamented with numerous longitudinal raised costae; aperture at the end of a fairly long neck ornamented with transverse ring-like costae.

Length 1.50–3 mm.

Distribution.—From the synonymy this species is very widely distributed. However, a study of the figures referred to this species will show that they are evidently not all one species. In the western Atlantic I have not seen specimens of the typical form such as are figured by Brady. He, however, records it from a *Challenger* station off Bermuda, and several off the Canaries. Egger records it from the western coast of Africa and there are numerous records for the species from the coast of Europe, especially about the British Isles. Specimens comparable to this figured by Brady do not occur in the *Albatross* material.

NODOSARIA SCALARIS (Batsch), var. SEPARANS H. B. Brady.

Nodosaria scalaris (Batsch), var. *separans* H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 511, pl. 64, figs. 16–19.—Pearcey, Trans. Glasgow Nat. Hist. Soc., vol. 2, 1890, p. 178.—Wright, Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 484.—Chapman, Proc. Zool. Soc. London, pt. 1, 1895, p. 32; The Foraminifera, 1902, p. 402.—Dakin, Rep. Ceylon Pearl Oyster Fish., vol. 5, 1906, p. 235.—Chapman, Journ. Quekett Micr. Club, ser. 2, vol. 10, 1907, p. 129.—Pearcey, Trans. Roy. Soc. Edinb., vol. 49, 1914, p. 1021.—Chapman, Biol. Res. *Endeavour*, vol. 3, pt. 1, 1915, p. 23.—Heron-Allen and Earland, Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 258.

According to Brady, this variety differs from the typical in having the last-formed chamber somewhat remote from the preceding ones. Such a character occurs in numerous other species, such as *Nodosaria intercellularis*, *N. sublineata*, etc. His type specimens were from the Indo-Pacific, but there are numerous records for it especially off the coast of the British Isles. The figures given by Millett and referred to this species[43] are not the same as Brady's, but have been made a new species.[44]

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[43] Journ. Roy. Micr. Soc., 1902, p. 520, pl. 11, figs. 11, 12.

[44] *Nodosaria millettii* Cushman, Proc. U. S. Nat. Mus., vol. 51, 1917, p. 654; Bull. 100, U. S. Nat. Mus., vol. 4, 1921, p. 202, pl. 36, fig. 5.

NODOSARIA COMATULA, new species.

Plate 14, fig. 5.

Nodosaria comata H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 509, pl. 64, figs. 1–5.—GOËS, Bull. Mus. Comp. Zoöl., vol. 29, 1896, p. 60.—FLINT, Rep. U. S. Nat. Mus., 1897 (1899), p. 311, pl. 57, fig. 3.—CHAPMAN, The Foraminifera, 1902, p. 402.—MILLETT, Journ. Roy. Micr. Soc., 1902, p. 512, pl. 11, fig. 2.

Nodosaria radicula (LINNAEUS), var. *raphanus* GOËS, Kongl. Svensk. Vet. Akad. Handl., vol. 19, No. 4, 1882, pl. 1, figs. 9, 10.

Description.—Test short and stout, composed of a few chambers, initial end broadly rounded, sometimes with a small central spine, apertural end slightly tapering; chambers inflated, giving a somewhat lobulate appearance to the periphery; sutures distinct, somewhat depressed; surface ornamented by numerous low, rounded, longitudinal costae, close together, 35–45 in the last-formed chamber of the adult, continuous from one chamber to another, in the adult the apertural end of the last-formed chamber sometimes smooth; aperture central, terminal, radiate.

Length up to 1 mm.

Distribution.—Type-specimen (U.S.N.M. Cat. No. 17823) from *Albatross* station D2377, in 210 fathoms (384 meters), in the Gulf of Mexico. The species is fairly frequent in the northern part of the Gulf of Mexico at depths of 100–300 fathoms (183–549 meters). There is a single specimen from a station off the coast of Georgia. Flint had specimens from both these regions. Goës had specimens from the Caribbean, 300–400 fathoms (549–732 meters). Brady's records for *Nodosaria comata* are as follows: "Somewhat plentifully off Bermuda, 435 fathoms (796 meters); and more sparingly off Culebra Island, West Indies, 390 fathoms (713 meters); off Sombrero Island, West Indies, 450 fathoms (823 meters); and in harbour-mud from Port Louis, Mauritius." Chapman records it as frequent in 200 fathoms (366 meters) outside the Funafuti Reef and Millett as occurring in great abundance in the Malay Archipelago.

I failed to find it in the collections I had from the North Pacific and, more surprisingly, it did not appear in all the rich collections I examined from the Philippines and adjacent regions where *Nodosaria* was so abundant.

It would seem, therefore, that we have here a species distinct from either *N. comata* (Batsch) or from *N. glans* D'Orbigny. This new species, *N. comatula*, has a distinctly lobed periphery, the chambers being distinct, the costae close-set but rounded, and very numerous. Its habitat is in the Western Atlantic in warm waters of 100-400 fathoms (183-732 meters) or more, and possibly in the Indo-Pacific.

Nodosaria comatula—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
17822	U.S.N.M.	1	D2313....	32 53 00 N.; 77 53 00 W..	99	57.2	crs.s., bk.sp.	Rare.
17823	U.S.N.M.	1	D2377....	29 07 30 N.; 88 08 00 W..	210	67.0	gy. m.......	Few.
17824	U.S.N.M.	3						
17825	U.S.N.M.	1	D2378....	29 14 30 N.; 88 09 30 W..	68	....	gy. m.......	Rare.
17826	U.S.N.M.	2	D2398....	28 45 00 N.; 86 26 00 W..	227	48.6	gy. m.......	Rare.
17827	U.S.N.M.	1	D2399....	28 44 00 N.; 86 18 00 W..	196	51.6	gy. m.......	Rare.
17828	U.S.N.M.	2	D2400....	28 41 00 N.; 86 07 00 W..	169	....	gy. m.......	Rare.

NODOSARIA RAPHANUS (Linnaeus).

Plate 15, fig. 6.

There are a few records from off the coast of the British Isles, mostly from single specimens, for this species. In the Summary of Results of the *Challenger* Expedition there are several *Challenger* stations given for this species, two off the West Indies, one off the northeastern coast of the United States, and one in the central part of the North Atlantic, west of the Azores. I have failed to find in the *Albatross* collections specimens which are at all like this species as figured by Brady in the *Challenger* report, which are similar to those I have found from the Philippine region.

NODOSARIA RAPHANISTRUM (Linnaeus).

Under this name Heron-Allen and Earland record two small specimens off the west of Scotland.[45]

NODOSARIA RAPHANISTRUM (Linnaeus), var. OBSOLETA Goës.

Plate 15, fig. 4.

Nodosaria raphanistrum (Linnaeus), *var. obsoleta* Goës, Bull. Mus. Comp. Zoöl., vol. 29, 1896, p. 63, pl. 6, fig. 3.

Under this varietal name, Goës figures a specimen 19 mm. in length which is similar to *Nodosaria raphanistrum*, except that the last-formed chambers are smooth, due to the disappearance of the ornamentation of the earlier part. They are from the Caribbean, 227–332 fathoms (416–608 meters), scarce. I have not found anything in the *Albatross* dredgings to correspond to this variety.

NODOSARIA SEMINUDA Reuss?

Plate 15 fig. 2.

Nodosaria obliqua (Linnaeus), var., Goës, Kongl. Svensk. Vet. Akad. Handl., vol. 19, No. 4, 1882, p. 4, pl. 1, fig. 17.

Nodosaria seminuda Goës, Kongl. Svensk. Vet. Akad. Handl., vol. 25, No. 9, 1894, p. 71, pl. 13, fig. 700; Bull. Mus. Comp. Zoöl., vol. 29, 1896, p. 64, pl. 6, figs. 4, 5.

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[45] Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 258.

Under this name Goës figures a very large form from the Caribbean. His specimens measure from 17–22 mm. in length. The early portion of the test is longitudinally costate, the later portion smooth, the sutures broad and limbate. These occurred at a depth of 300 fathoms (549 meters), but I have failed to find similar material from the Caribbean.

NODOSARIA FLINTII, new species.

Plate 14, fig. 1.

Nodosaria obliqua H. B. Brady (part) (not Linnaeus), Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 513, pl. 64, figs. 20–22.—Goës (part), Kongl. Svensk. Vet. Akad. Handl., vol. 25, No. 9, 1894, p. 70, pl. 12, figs. 691, 692.—Flint, Rep. U. S. Nat. Mus., 1897 (1899), p. 311, pl. 57, fig. 4.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 59, pl. 25, fig. 5.

Description.—Test very elongate, slender, gracefully tapering, somewhat curved, the initial end with a stout spine; chambers numerous, early ones indistinct, last-formed ones much more distinct; sutures of the early portion often indistinct, not at all depressed, later ones very distinct between the inflated chambers; surface ornamented by longitudinal costae, increasing in number as the diameter of the test increases, earlier ones spirally twisted and reaching to or onto the terminal spine, later ones straight, in the adult 15–20 in number, running to the apertural end, and their ends forming a tooth-like crown about the aperture itself, the costae with the peripheral portion rounded, often broadest in the central portion of the chamber, narrowing over the sutures; aperture with a tapering neck, usually eccentric.

Length up to 8.50 mm.

Distribution.—Type-specimen (U.S.N.M. Cat. No. 17804) from *Albatross* station D2682, in 990 fathoms (1,811 meters), off the northeastern coast of the United States. The species is a very common and characteristic one from the latitude of Cape Cod and Georges Bank southward along the Atlantic coast, and into the Gulf of Mexico, with a few stations in the Caribbean. Brady undoubtedly had this species from his figures. Some of his records in the *Challenger* Summary of Results volume include a station off New York in the midst of the area where there are numerous records for this species. Others are from the region of Bermuda, off the West Indies, and off the coast of Brazil. Some other records for the eastern Atlantic are off the Canaries and the west coast of Africa. Flint's records are all in the same region from which I have had abundant *Albatross* material. I have not seen this species in European material I have examined. It is recorded from about the British Isles by several authors.

I have had specimens from the eastern tropical Pacific which seem very similar to this, but that I have recorded from the Philippines is different.[46]

As developed in the western Atlantic this is a very well-defined species.

Nodosaria flintii—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
17776	U.S.N.M.	2	D2018....	37 12 22 N.; 74 20 04 W..	788	39.0	bu. m.......	Rare.
17777	U.S.N.M.	8	D2035....	39 26 16 N.; 70 02 37 W..	1,362	....	glob. oz.....	Common.
17778	U.S.N.M.	10+	D2037....	38 53 00 N.; 69 23 30 W..	1,731	38.0	glob. oz.....	Abundant.
17779	U.S.N.M.	10+	D2038....	38 30 30 N.; 69 08 25 W..	2,033	....	glob. oz.....	Abundant.
17780	U.S.N.M.	4	D2039....	38 19 26 N.; 68 20 20 W..	2,369	....	glob. oz.....	Few.
17781	U.S.N.M.	8	D2041....	39 22 50 N.; 68 25 00 W..	1,608	38.0	glob. oz.....	Common.
17782	U.S.N.M.	2	D2042....	39 33 00 N.; 68 26 45 W..	1,555	38.5	glob. oz.....	Rare.
17783	U.S.N.M.	10+	D2043....	39 49 00 N.; 68 28 30 W..	1,467	38.5	glob. oz.....	Abundant.
17784	U.S.N.M.	3	D2052....	39 40 05 N.; 69 21 25 W..	1,098	45.0	glob. oz.....	Few.
17785	U.S.N.M.	1	D2097....	37 56 20 N.; 70 57 30 W..	1,917	....	glob. oz.....	Rare.
17786	U.S.N.M.	2	D2116....	35 45 23 N.; 74 31 25 W..	888	39.0	bu.m.,fne.s.	Rare.
17756	U.S.N.M.	1	D2144....	9 49 00 N.; 79 31 30 W..	896	....	gn. m.......	Rare.
17787	U.S.N.M.	1	D2150....	13 34 45 N.; 81 21 10 W..	382	45.8	wh. crs. s...	Rare.
17788	U.S.N.M.	1	D2160....	23 10 31 N.; 82 20 37 W..	167	....	co..........	Rare.
17789	U.S.N.M.	1	D2172....	38 01 15 N.; 73 44 00 W..	568	39.0	gn. m.......	Rare.
3135	U.S.N.M.	1	D2174....	38 15 00 N.; 72 03 00 W..	1,594	....	gy. m.......	Rare.
17790	U.S.N.M.	1						
17791	U.S.N.M.	1	D2189....	39 49 30 N.; 70 26 00 W..	600	39.7	gn. m., s....	Rare.
3087	U.S.N.M.	1	D2203....	39 34 15 N.; 71 41 15 W..	705	38.9	gn. m., s....	Abundant.
3088	U.S.N.M.	1						
17792	U.S.N.M.	10						
17793	U.S.N.M.	2	D2204....	39 30 30 N.; 71 44 30 W..	728	39.1	br. m.......	Rare.
17794	U.S.N.M.	2	D2217....	39 47 20 N.; 69 34 15 W..	924	38.1	gy. m.......	Rare.
17795	U.S.N.M.	1	D2219....	39 46 22 N.; 69 29 00 W..	948	38.8	gy. m.......	Rare.
17796	U.S.N.M.	2	D2228....	37 25 00 N.; 73 06 00 W..	1,582	36.8	br.m........	Rare.
17797	U.S.N.M.	1	D2234....	39 09 00 N.; 72 03 15 W..	810	38.6	gn. m.......	Rare.
17798	U.S.N.M.	10	D2247....	40 03 00 N.; 69 57 00 W..	67	52.4	gn.m., bk.s.	Common.
17799	U.S.N.M.	2	D2377....	29 07 30 N.; 88 08 00 W..	210	67.0	gy. m.......	Rare.
17800	U.S.N.M.	1	D2385....	28 51 00 N.; 88 18 00 W..	730	40.1	gy. m.......	Rare.
17801	U.S.N.M.	2	D2399....	28 44 00 N.; 86 18 00 W..	196	51.6	gy. m.......	Rare.
17802	U.S.N.M.	9	D2425....	36 20 24 N.; 76 46 30 W..	119	51.5	dk. gy. m., fne. s.	Common.
17803	U.S.N.M.	1	D2679....	32 40 00 N.; 76 40 30 W..	782	38.6	lt. gy. oz....	Rare.
17804	U.S.N.M.	1	D2682....	39 38 00 N.; 70 22 00 W..	990	....	gn. m.......	Abundant.
17805	U.S.N.M.	10+						
17806	U.S.N.M.	7	D2689....	39 42 00 N.; 71 15 30 W..	525	....	gn. m.......	Frequent.
17807	U.S.N.M.	1	D2706....	41 28 30 N.; 65 35 30 W..	1,188	....	gy. oz., for..	Rare.
17808	U.S.N.M.	3	D2710....	40 06 00 N.; 68 01 00 W..	984	....	gn. m.......	Few.

NODOSARIA VERTEBRALIS (Batsch).

Plate 14, fig. 6.

There are various forms of this general type which may be referred to *Nodosaria vertebralis* (Batsch), although the original figure is not as perfect as might be wished. The West Indian species has stout, broad chambers, and the last-formed chamber rotund with a short apertural extension.

Flint records *Nodosaria catenulata* H. B. Brady from the Gulf of Mexico at *Albatross* station D2400.[47] I have a specimen from the same station showing the same characters, and it seems to be a local variety of *Nodosaria vertebralis*. The true *N. catenulata* seems to be confined to the Indo-Pacific.

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[46] Bull. 100, U. S. Nat. Mus., vol. 4, 1921, p. 210, pl. 38, fig. 1.

[47] Rep. U. S. Nat. Mus., 1897 (1899), p. 312, pl. 58, fig. 2.

Nodosaria vertebralis, var.—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
17749	U.S.N.M.	1	D2400....	28° 41′ 00″ N.; 86° 07′ 00″ W..	169	°F.	gy. m.......	Rare.

NODOSARIA VERTEBRALIS (Batsch), var. ALBATROSSI, new variety.

Plate 15, fig. 1.

Nodosaria vertebralis H. B. BRADY (not Batsch), Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 514, pl. 63, fig. 35; pl. 64, figs. 11–14.—FLINT, Rep. U. S. Nat. Mus., 1897 (1899), p. 312, pl. 57, fig. 5.

Description.—Test elongate, gradually tapering, often slightly curved, the proloculum or initial chamber often being of greater diameter than those immediately following; chambers numerous, distinct, not inflated, except those near the apertural end; sutures broad, of clear shell material, not depressed except near the apertural end; wall ornamented by numerous longitudinal costae, typically 15–18 in the adult, continuous from one chamber to another, sharp at the periphery, broader at the base, initial end of the test with a short stout spine; aperture slightly extended, radiate.

Length up to 8 mm.

Distribution.—Type-specimen (U.S.N.M. Cat. No. 17743) from *Albatross* station D2377, in 210 fathoms (384 meters), in the Gulf of Mexico. This variety is common in the Gulf of Mexico and off the southeastern coast of the United States. Flint had it from the northern part of the Gulf of Mexico. Brady had it from off Bermuda, off the Azores, and among the West Indies, at depths of 300–450 fathoms (549–823 meters). He also records it from the South Pacific, 120–300 fathoms (220–549 meters). I have recorded it from the Philippines,[48] but the Philippine specimens are not of this variety. The chambers are longer and the apertural end much more extended.

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[48] Bull. 100, U. S. Nat. Mus., vol. 4, 1921, p. 211, pl. 38, figs. 2, 3; pl. 40, fig. 2.

Nodosaria vertebralis, var. albatrossi—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
17741	U.S.N.M.	3	D2313....	32 53 00 N.; 77 53 00 W..	99	57.2	crs. s., bk. sp.	Few.
17742	U.S.N.M.	2	D2314....	32 43 00 N.; 77 51 00 W..	159	47.4	crs. s., bk. sp.	Rare.
17743	U.S.N.M.	1	D2377....	29 07 30 N.; 88 08 00 W..	210	67.0	gy. m.......	Abundant
17744	U.S.N.M.	10						
17745	U.S.N.M.	6	D2378....	29 14 30 N.; 88 09 30 W :	68	....	gy. m.......	Frequent.
17746	U.S.N.M.	1	D2394....	28 38 30 N.; 87 02 00 W :	420	41.8	gn. m.......	Rare.
17747	U.S.N.M.	7	D2399....	28 44 00 N.; 86 18 00 W..	196	51.6	gy. m.......	Frequent.
17748	U.S.N.M.	1	....	Off Sand Key, Fla.......	72	....	....	Rare.

NODOSARIA STRIOLATA (Goës).

Plate 15, fig. 5.

Nodosaria striolata Goës, Kongl. Svensk. Vet. Akad. Handl., vol. 25, No. 9, 1894, p. 71, pl. 13, fig. 701; Bull. Mus. Comp. Zoöl., vol. 29, 1896, p. 64, pl. 6, figs. 6, 7.

Goës described this species from the Caribbean. It is elongate, tapering, with rounded short chambers, and the surface faintly costate, the final chamber often smooth. I have failed to find specimens agreeing with this species.

NODOSARIA PLEBEIA Reuss.

Heron-Allen and Earland record one specimen which they refer to this species from the Clare Island region of western Ireland.[49]

NODOSARIA PERVERSA Schwager.

There are three *Challenger* stations for this species in the Atlantic, one with a question mark off Bermuda, one in the central part of the South Atlantic, and one off the Cape of Good Hope. Pearcey records it from the region south of the Falkland Islands in deep water. I have had no specimens which can be referred to this species, nor are any recorded from the coast of Europe.

NODOSARIA SUBLINEATA H. B. Brady.

Plate 17, fig. 1.

Nodosaria hispida D'Orbigny, var. *sublineata* H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 508, pl. 63, figs. 19–22.—Flint, Rep. U. S. Nat. Mus., 1897 (1899), p. 311, pl. 56, fig. 4.

Description.—Test elongate, composed of a very few chambers, the earlier ones especially in the microspheric form close-set, the later ones remote with the cylindrical neck of the preceding chamber forming the connection; surface ornamented on the upper portion with delicate costae, the remainder of the test spinose; aperture at the end of a long cylindrical neck which tapers to the small aperture, the outside of the neck spinose.

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[49] Proc. Roy. Irish Acad., vol. 31, pl. 64, 1913, p. 92.

Length up to 2.50 mm.

Distribution.—Brady's original records are *Challenger* station 33, off Bermuda, 435 fathoms (796 meters), and station 122, southwest of Pernambuco, Brazil, 350 fathoms (640 meters). Flint's station was in the northern part of the Gulf of Mexico, at a depth of 68 fathoms (125 meters). In the *Albatross* collections specimens have also occurred off the Carolina coast, in the Gulf of Mexico, and in the Caribbean.

It is probable that the specimens from the Philippines that I have referred to this species are not the same.[50]

Nodosaria sublineata—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
17888	U.S.N.M.	3	D2150....	13 34 45 N.; 81 21 10 W..	382	45.8	wh. crs. s....	Few.
17889	U.S.N.M.	1	D2377....	29 07 30 N.; 88 08 00 W..	210	67.0	gy. m.......	Rare.
17890	U.S.N.M.	1	D2394....	28 38 30 N.; 87 02 00 W..	420	41.8	gn. m.......	Rare.
17891	U.S.N.M.	4	D2395....	28 36 15 N.; 86 50 00 W..	347	44.1	gy. m.......	Few.
17892	U.S.N.M.	5	D2398....	28 45 00 N.; 86 26 00 W..	227	48.6	gy. m.......	Frequent.
17893	U.S.N.M.	1	D2399....	28 44 00 N.; 86 18 00 W..	196	51.6	gy. m.......	Rare.
17894	U.S.N.M.	2	D2400....	28 41 00 N.; 86 07 00 W..	169	....	gy. m.......	Rare.
17895	U.S.N.M.	1	D2614....	34 09 00 N.; 76 02 00 W..	168	....	gy. s., bk. sp.	Rare.
17896	U.S.N.M.	1	D2677....	32 39 00 N.; 76 50 30 W..	478	39.3	gn. m.......	Rare.

NODOSARIA INTERCELLULARIS H. B. Brady.

Plate 14, figs. 2–4; pl. 17, fig. 8.

Nodosaria intercellularis H. B. BRADY, Quart. Journ. Micr. Sci., vol. 21, 1881, p. 63; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 515, pl. 65, figs. 1–4.

Nodosaria radicula LINNAEUS, var. *scalaris* Goës (not Batsch), Kongl. Svensk. Vet. Akad. Handl., vol. 19, No. 4, 1882, p. 21, pl. 1, fig. 8.

Nodosaria scalaris Goës (not Batsch), Kongl. Svensk. Vet. Akad. Handl., vol. 25, No. 9, 1894 (in part?), p. 73, pl. 13, fig. 718 (not 716, 717).

Description.—"Test more or less arcuate, inferior extremity mucronate; composed of about 6 segments, the earlier of which are short and slightly inflated, the later ones elliptical or pyriform. Surface-ornament of the earlier segments consisting of longitudinal costae; the later chambers marked by lines of closely set perforations which communicate with chamberlets formed in the furrows between the ribs. Aperture situated in a produced terminal neck, with annular or spiral raised ornament and phialine or cleft lip.

"Length, 1/15 inch (1.70 mm.)."

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[50] Bull. 100, U. S. Nat. Mus., vol. 4, 1921, p. 207, pl. 37, fig. 1.

Distribution.—Brady originally described this species from *Challenger* station 33, off Bermuda, at a depth of 435 fathoms (796 meters). In the volume on Summary of Results of the *Challenger* Expedition *Nodosaria intercellularis* is recorded from station 23, off Sombrero Island, 450 fathoms (823 meters) with a question, and from station 24, off Culebra Island, 390 fathoms (713 meters), without question. As has already been noted in many species of the Lagenidae particularly, these two stations, with that from off Bermuda, contain many identical species and species which are also peculiar to the warmer waters of the western Atlantic. With these as a basis, it is interesting to find very typical specimens of this species from *Albatross* station D2756, in 417 fathoms (763 meters), off the coast of Brazil and a single broken fragment from D2150, in 382 fathoms (697 meters), in the Caribbean. All these stations together mark very definitely the range of so many and peculiar species of this region. An examination of Goës's paper on the Caribbean region shows that his figure is very clearly this species. He refers to it the specimen from off the Azores and which is referred to above. This may possibly be the same.

Brady gives a considerable note on the peculiar structure of this species. Our specimens show this character very well. In view of the restricted range of so many species of the western tropical Atlantic it is interesting to examine the other records referred to *Nodosaria intercellularis* H. B. Brady. The first of these, that of Egger,[51] records the species from Mauritius and off western Australia. A reference to his figure, however, shows decidedly that his figured specimen is not identical with the very well characterized specimens figured by Brady and which I have seen from the *Albatross* material. Chapman[52] records the species as very rare in the Arabian Sea, but the name is followed by a question mark in his text and may therefore probably be eliminated. He records it as very rare in 200 fathoms (366 meters) outside Funafuti Reef,[53] but no figure is given and the record will have to stand on Chapman's determination. Dakin records it sparingly from the Gulf of Manaar.[54] This also, without figure, may or may not be this species. Chapman also records "one typical specimen" from the Gingin Chalk of Australia. This specimen is figured and certainly does not appear to be identical with our western Atlantic species, as the form of the chambers is very different. It would seem, therefore, that this species is a recent one of the western Atlantic and a possibility that it occurs in the Indo-Pacific region.

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[51] Abh. kön. bay. Akad. Wiss. München, Cl. II, vol. 18, 1893, p. 345, pl. 11, figs. 12, 23.

[52] Proc. Zool. Soc. London, pt. 1, 1895, p. 32.

[53] Journ. Linn. Soc. Zoology, vol. 28, 1902, p. 402.

[54] Rep. Ceylon Pearl Oyster Fish., vol. 5, 1906, p. 235.

Our species shows that the early chambers are globular and close set, as are those figured by Brady, the later ones becoming more elongate and remote. The neck is slender, long, and tapering, and ornamented with peculiar platelike ornamentation. The aperture itself is surrounded by projecting teeth, usually four in number. In certain of its characters it resembles *Nodosaria substriatula* Cushman, which occurs widely spread in the Indo-Pacific. There are evidently other species, both recent and fossil, which have a similar ornamentation of the surface but which are not identical with our western Atlantic species.

Nodosaria intercellularis—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of abundance.	Abundance.
18772	U.S.N.M.	4	D2756....	° ′ ″ ° ′ ″ 3 22 00 S.; 37 49 00 W..	417	°F. 40.5	gy. sp.......	Few.

NODOSARIA ANTILLEA, new species.

Plate 14, fig. 9.

Sagrina virgula H. B. Brady (part), Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 583, pl. 76, figs. 9, 10 [?].

Description.—Test elongate, tapering, straight or slightly curved, composed of a few chambers in a linear series, the later ones somewhat remote, surface of the upper part of the chamber smooth, basal portion with a series of spines or broken costae, the chamber angled near the base, sutures distinct, apertural end contracted into a short cylindrical neck with a broad phialine lip.

Length up to 1 mm.

Distribution.—Type-specimen (U.S.N.M. Cat. No. 18773) from *Albatross* station D2614, in 168 fathoms (307 meters), off the coast of Carolina. Brady records this species from off Pernambuco, Brazil, in 675 fathoms (1,234 meters). His other records are from the south Pacific.

There are two species involved in Brady's plate of *Sagrina virgula;* one of these, represented by figures 4–7, is a true *Siphogenerina*, that occurs at numerous stations in comparatively shallow water in the Indo-Pacific region. The other is apparently a *Nodosaria*, and while various forms occur in deeper water in various parts of the oceans, it is very distinct from the other form figured. The very flaring lip is often prominent at the base of the new-formed chamber. The chamber is usually somewhat angled below the median line and this area often develops spines, reminding one somewhat of the condition seen in *Nodosaria adolphina* D'Orbigny and its relatives. This species is probably to be found at considerable depths throughout the West Indian region and should be carefully compared with that from the Pacific.

Nodosaria antillea—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″				
18773	U.S.N.M.	1	D2614....	34 09 00 N.; 76 02 00 W..	168	....	gy. s., bk. sp.	Few.
18780	U.S.N.M.	2						

NODOSARIA HISPIDA D'Orbigny.

Plate 16, fig. 6.

There are records for this species off Dublin and Wicklow, a single specimen only;[55] off the Isle of Man;[56] and from the Estuary of the Dee (Siddall).[57]

Balkwill and Wright's figure shows a species different from that of the western Atlantic unless it is similar to *Nodosaria sublineata* H. B. Brady. No typical *Nodosaria hispida* has been found in the material I have examined from the western Atlantic.

NODOSARIA HIRSUTA D'Orbigny, var. ACULEATA D'Orbigny.

Plate 17, fig. 4.

Nodosaria aculeata D'ORBIGNY, Foram. Foss. Vienne, 1846, p. 35, pl. 1, figs. 26, 27.

Nodosaria hirsuta D'ORBIGNY, var. *aculeata* CUSHMAN, Bull. 100, U. S. Nat. Mus., vol. 4, 1921, p. 214, pl. 38, figs. 7, 8.

Description.—Variety with the test covered with coarse aculeate spines, radiately placed on the exterior, the chambers themselves elongate, and the apertural end with an elongate neck ending in a series of large triangular teeth.

Distribution.—I have already recorded this variety from the Philippine region, and it is interesting to find specimens apparently identical with the Philippine material in the northern part of the Gulf of Mexico at 196 and 210 fathoms (359 and 384 meters). The Philippine stations ranged from 201–554 fathoms (368–1,012 meters).

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[55] Balkwill and Wright, Proc. Roy. Irish Acad., ser. 2, vol. 3, 1882, p. 548.

[56] Balkwill and Wright, Trans. Roy. Irish Acad., vol. 28, 1885, p. 343.

[57] H. B. Brady, Journ. Roy. Micr. Soc., 1887, p. 909.

Nodosaria hirsuta, var. aculeata—*material examined.*

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
18751	U.S.N.M.	3	D2377....	29 07 30 N.; 88 08 00 W..	210	67.0	gy. m.......	Few.
18752	U.S.N.M.	1	D2399....	28 44 00 N.; 86 18 00 W..	196	51.6	gy. m.......	Rare.

NODOSARIA SETOSA Schwager.

The only record for this seems to be that of Pearcey,[58] who recorded it as rare from Burdwood Bank, station 346, 56 fathoms (102 meters).

NODOSARIA, species.

Plate 14, fig. 7.

From *Albatross* station D2614 there is a single specimen of an elongate, very slightly tapering species, the chambers gradually increasing in length, which somewhat resembles *Nodosaria exilis* Neugeboren. It is not like any other species of the genus that I have had from the western Atlantic.

Nodosaria, species—*material examined.*

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
18776	U.S.N.M.	1	D2614....	34 09 00 N.; 76 02 00 W..	168	....	gy.s., bk.sp	Rare.

Genus LINGULINA D'Orbigny, 1826.

Lingulina D'Orbigny (type, *L. carinata* D'Obigny), Ann. Sci. Nat., vol. 7, 1826, p. 256.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 517.—Chapman, The Foraminifera, 1902, p. 190.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 61.

Description.—Test compressed; chambers arranged in a linear series, usually closely set; aperture usually elongate, corresponding to the form of the chamber.

This genus seems to be less clearly defined than many of the genera established by D'Orbigny. It is closely related to *Nodosaria*, differing from this genus only in the compressed character and the consequent changes in the aperture.

The largest and best developed species of this genus are found in warm seas.

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[58] Trans. Roy. Soc. Edinb., vol. 49, 1914, p. 1021.

LINGULINA QUADRATA Heron-Allen and Earland.

Plate 17, fig. 12.

Lingulina quadrata HERON-ALLEN and EARLAND, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 95, pl. 8, fig. 11.

Description.—"Test bilocular, highly compressed, quadrate and carinate, the final chamber drawn out sometimes at the apex, which is either simple or furnished with an entosolenian tube. The line of suture between the two chambers is slightly depressed and curved at the marginal edges toward the base of the shell.

"Length 0.16 mm.; breadth 0.13 mm."

Distribution.—Heron-Allen and Earland described this species from the Clare Island region and recorded it also from Noss Head, in the Moray Firth, and at several other *Goldseeker* stations about the British Isles, but always rare.

This is a peculiar little species which has its relations with the entosolenian Lagenas rather than elsewhere.

LINGULINA BILOCULI Wright.

Plate 18, figs. 3-5.

Lingulina carinata D'ORBIGNY, var. *biloculi* WRIGHT, Rep. Belfast Nat. Field Club, ser. 2, vol. 3, No. 6, 1910 (1911), App. No. 2, p. 13, pl. 2, fig. 10.

Lingulina biloculi HERON-ALLEN and EARLAND, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 94, pl. 8, figs. 5-7; Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 259.

Lingulina carinata SIDEBOTTOM (part), Mem. Proc. Manchester Lit. Philos. Soc., vol. 51, No. 9, 1907, p. 3, pl. 1, figs. 18, 19.

Description.—Test more or less compressed, composed of 2 and sometimes 3 chambers, periphery rounded, basal end rounded or slightly truncate; suture distinct, slightly depressed, somewhat limbate; wall smooth, thin, finely punctate; aperture elliptical, small, or with an entosolenian tube.

Length about 0.15 mm.

Distribution.—Wright originally described this species from the Estuarine Clays of Ireland. Heron-Allen and Earland have recorded it from off the coast of Ireland, in the Clare Island region, off the west of Scotland, and note that they have found it in several *Goldseeker* dredgings and that "it will probably be found to occur in muddy shallow-water deposits all round the western coast of Scotland and Ireland." It does not occur in the western Atlantic material.

LINGULINA CARINATA D'Orbigny.

Plate 19, figs. 1, 2.

Lingulina carinata D'ORBIGNY, Ann. Sci. Nat., vol. 7, 1826, p. 257, No. 1; Modèles, No. 26; in Barker, Webb, and Berthelot, Hist. Nat. Isles Canaries, vol. 2, pt. 2, Foraminifères, 1839, p. 124, pl. 1, figs. 5, 6.—Goës (part), Bull. Mus. Comp. Zoöl., vol. 29, 1896, p. 65.—FLINT, Rep. U. S. Nat. Mus., 1897 (1899), p. 312, pl. 58, fig. 3.

Description.—Test elongate, tapering, much compressed, periphery carinate, with a definite keel, which is continuous from the last-formed chamber to the initial end; chambers distinct, somewhat inflated, periphery not lobulate; sutures distinct, slightly depressed; wall smooth; aperture elongate, with lateral projections rising above the apertural end of the test.

Length up to 4 mm.

Distribution.—D'Orbigny's type-specimens were from the Antilles, probably from Cuba in shallow water. Flint had specimens from *Albatross* station D2416, off the coast of Georgia, which I have seen. They are young specimens and I have a similar specimen from the same station. There is a much finer specimen in the collection from off Ajax Reef, Florida, in 40 fathoms (73 meters). This would seem to indicate that this species is well developed in this region in comparatively shallow water. It is very doubtful if much of the material from other regions referred to this species is really the same.

It is close to *Lingulina grandis* which I described from the Philippine region.

Lingulina carinata—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
17456	U.S.N.M.	1	D2416	31 26 00 N.; 79 07 00 W.	276	53.8	co., brk. sh.	Rare.
17457	U.S.N.M.	1		Ajax Reef, Fla	40			Rare.

LINGULINA SEMINUDA Hantken.

Plate 17, figs. 8, 9, 11; pl. 18, figs. 1, 2.

Lingulina costata D'ORBIGNY, var. *seminuda* HANTKEN, Mitth. Jahrb. ung. geol. Anstalt, vol. 4, 1875, p. 41, pl. 4, figs. 8*a*, *b*.

Lingulina carinata D'ORBIGNY, var. *seminuda* H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 518, pl. 65, figs. 14, 15.—FLINT, Rep. U. S. Nat. Mus., 1897 (1899), p. 312, pl. 58, fig. 4.

Nodosarina carinata Goës (not D'ORBIGNY), Kongl. Svensk. Vet. Akad. Handl., vol. 19, No. 4, 1882, p. 58, pl. 1, fig. 67 (not figs. 65, 66).

Description.—Test ovate, only slightly longer than broad, rapidly tapering from the subacute initial end to the greatest breadth at the last-formed chamber, compressed; chambers few, increasing rapidly in size as added, inflated, the periphery with numerous fine longitudinal costae; remainder of chamber smooth and polished; sutures very distinct, depressed; wall thick; aperture with an elongate depression, formed by two lip-like projections from the end of the test.

Length up to 2.50 mm.

Distribution.—The first record for this as a recent form is that of Brady in the *Challenger* report who speaks of it as follows: "The larger Lingulinae, not uncommon in certain areas of the North Atlantic, are seldom really carinate, but the lateral edges of the test are slightly rounded, and each margin is ornamented with a few delicate longitudinal ribs. With this exception the lateral faces are smooth." He gives 6 *Challenger* stations in the North Atlantic for this form, ranging from 390–862 fathoms (713–1,577 meters). Two of these are definitely given: Station 24, off Culebra Island, West Indies, 390 fathoms (713 meters), and station 75, off the Azores, 450 fathoms (823 meters), from which stations he obtained the finest specimens. He also gives two stations in the South Atlantic, 350 and 675 fathoms (640 and 1,234 meters), off Pernambuco, Brazil, and records it in the Mediterranean in 1,200 fathoms (2,195 meters). Flint recorded this form from the Gulf of Mexico, 169 and 170 fathoms (309 and 311 meters). Chapman has recorded it as very rare in 200 fathoms (366 meters), outside the Funafuti Reef in the Pacific. Heron-Allen and Earland[59] record and figure some small specimens with two chambers which they refer to this form, but after seeing a large series of the typical form from the western Atlantic, I do not think that their form from off the British coast is the same. The *Albatross* specimens, as the table shows, range from the coast of Brazil northward into the Caribbean and Gulf of Mexico, with one station off the coast of Georgia and one farther north, along the eastern coast of the United States.

Some of the specimens have the costae of the periphery practically wanting, but usually traces may be seen near the base and the periphery even in such cases is rounded and not carinate.

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[59] Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 259, pl. 42, figs. 6, 7.

Lingulina seminuda—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
17458	U.S.N.M.	2	D2150....	13 34 45 N.; 81 21 10 W..	382	45.8	wh. crs. s....	Rare.
17459	U.S.N.M.	1	D2202....	39 38 00 N.; 71 39 45 W..	515	39.1	gn. m......	Rare.
17460	U.S.N.M.	1	D2355....	20 56 48 N.; 86 27 00 W..	399	....	yl. oz........	Rare.
17461	U.S.N.M.	10+	D2399....	28 44 00 N.; 86 18 00 W..	196	51.6	gy. m.......	Abundant.
17462	U.S.N.M.	3	D2400....	28 41 00 N.; 86 07 00 W..	169	....	gy. m.......	Few.
17463	U.S.N.M.	2	D2415....	30 44 00 N.; 79 26 00 W..	440	45.6	co. crs. sh...	Rare.
17464	U.S.N.M.	1	D2751....	16 54 00 N.; 63 12 00 W..	687	40.0	bu. glob. oz.	Rare.
17465	U.S.N.M.	1	D2760....	3 22 00 S.; 37 49 00 W..	417	40.5	br. co........	Rare.

LINGULINA BICARINATA Sidebottom.

Plate 17, figs. 5–7; pl. 18, figs. 6, 7.

Lingulina carinata D'Orbigny, var. *bicarinata* Sidebottom, Mem. Proc. Manchester Lit. Philos. Soc., vol. 51, no. 9, 1907, p. 3, pl. 1, fig. 20; vol. 54, 1910, p. 20.—Heron-Allen and Earland, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 94, pl. 8, figs. 3, 4; Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 259, pl. 42, figs. 3–5.

Description.—Test elongate, much compressed, composed of two or three chambers, periphery of the test with two parallel keels; chambers distinct, slightly inflated; sutures slightly depressed, distinct; wall smooth, thin, finely punctate; aperture elongate, terminal central, between the keels which are much extended about the apertural end.

Length, 0.10–0.25 mm.

Distribution.—Sidebottom originally described this species as very rare from the Mediterranean, from off the coast of the Island of Delos, and from the Bay of Palermo, Sicily. Heron-Allen and Earland record it from off the British Isles, in the Clare Island region, from the west of Scotland, from off Noss Head, in the Moray Firth, and at several other stations about the Scottish coast. I have seen no material from the western Atlantic.

This seems to be a true *Lingulina*, but does not seem closely enough related to typical *L. carinata* D'Orbigny of the West Indies to allow its being placed as a variety of that species, and I have therefore given it specific rank.

LINGULINA ARMATA Sidebottom.

Plate 17, fig. 2.

Lingulina armata Sidebottom, Mem. Proc. Manchester Lit. Philos. Soc., vol. 51, no. 9, 1907, p. 4, pl. 1, fig. 21.—Heron-Allen and Earland, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 95, pl. 8, fig. 8.

Description.—Test composed of two chambers, somewhat compressed, the periphery of the initial chamber with a series of small spines; suture distinct, not depressed; wall smooth; aperture elongate with an entosolenian tube.

Length 0.08–0.10 mm.

Distribution.—Sidebottom originally described this minute species from the Mediterranean, off the coast of the Island of Delos, and Heron-Allen and Earland have recorded it from the Clare Island region as well as the following: *Goldseeker* dredgings from Noss Head (Moray Firth), Scapa Flow (Orkney Islands), and in the Minch.

This is a peculiar little species and seems almost like a young form of a larger species. The finding of it by Heron-Allen and Earland at numerous stations off the British Isles seems to show that it is a valid species with these peculiar characters. It has not occurred in the western Atlantic as far as I have seen.

LINGULINA PELLUCIDA Sidebottom.

Plate 17, fig. 10.

Lingulina pellucida SIDEBOTTOM, Mem. Proc. Manchester Lit. Philos. Soc., vol. 51, No. 9, 1907, p. 4, pl. 1, figs. 22–25; vol. 54, 1910, p. 20.—HERON-ALLEN and EARLAND, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 96, pl. 8, fig. 10; Journ. Roy. Micr. Soc., 1916, p. 47.—SIDEBOTTOM, Journ. Roy. Micr. Soc., 1918, p. 136.

Description.—Test longer than broad, compressed, especially in the later chambers, periphery rounded in transverse section; composed of 2 or 3 chambers, earlier one subglobular, the second and third much more compressed, the initial chamber oval, the second somewhat embracing and broader than the first, with a spine from each of the posterior angles of the periphery; chamber three may be of the same form or may be remote, with a short neck, with or without a spine developed in the second chamber; sutures distinct, depressed; wall smooth and finely punctate; aperture elliptical, at the end of a definite neck, with a phialine lip.

Length, 0.15–0.25 mm.

Distribution.—Sidebottom originally described this species from the Mediterranean, it being common off the Island of Delos in the Aegean Sea, and rare at the Bay of Palermo, Sicily. Heron-Allen and Earland have recorded typical specimens from off the coasts of the British Isles, in the Clare Island region, off Noss Head in the Moray Firth, and off the coast of South Cornwall. Sidebottom also records two specimens from the eastern coast of Australia in 465 fathoms (850 meters).

This is another of the species which has not occurred, so far as I have seen, in the western Atlantic. The elongate, tubular aperture, with a phialine lip, makes the species very different from typical *Lingulina*.

TRIFARINA, new genus.

Rhabdogonium H. B. BRADY (not Reuss), Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 524 (and subsequent authors).

Triplasia CUSHMAN (not Reuss), Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 62.

Description.—Test elongate, triangular in transverse section; the early chambers in an irregular spiral, later ones very loosely so or even uniserial; wall thin, translucent, finely punctate; aperture terminal not radiate, at the end of a short, often phialine lip.

The recent material which composes this genus has been referred to a number of genera. *Triplasia* of Reuss is based on Cretaceous species which are three-sided and seem to belong rather to the Textulariidae, possibly to *Tritaxia.* His name later changed by him to *Rhabdogonium*, on account of the finding of species polygonal in transverse section, is based on similar Cretaceous material.

The Recent material is different from these. It is more nearly allied to *Uvigerina* and *Siphogenerina* than to *Nodosaria.* The early development is similar to that of *Uvigerina* and the aperture is not of the radiate form seen in most of the *Nodosaria* group. A new genus has been erected for this. The Pacific species which I have called *Triplasia reussi* should be known as *Trifarina reussi* Cushman.

Type-species.—*Trifarina bradyi* Cushman, new species.

TRIFARINA BRADYI, new species.

Plate 22, figs. 3–9.

Rhabdogonium tricarinatum H. B. BRADY (not *Vaginulina tricarinata* d'Orbigny), Rep. Voy. *Challenger*, Zoology, vol. 9, 1884 p. 525, pl. 67, figs. 1–3; Journ. Roy. Micr. Soc., 1887, p. 910.—H. B. BRADY, PARKER, and JONES, Trans. Zool. Soc. London, vol. 12, 1888, p. 223, pl. 45, fig. 3.—WRIGHT, Ann. Mag. Nat. Hist., vol. 4, ser. 6, 1889, p. 449; Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 484.—EGGER, Abh. kön. bay. Akad. Wiss. München, Cl. II, vol. 18, 1893, p. 355, pl. 11, figs. 49, 50; pl. 12, figs. 36–38.

Description.—Test elongate, slightly tapering toward either end, often somewhat twisted, triangular in transverse section, with carinae at three angles, thin and fairly high, running from the initial end to the aperture, even onto the neck itself; chambers distinct, those of the earlier portion at least irregularly spiral, later ones less distinctly so; sutures distinct but not depressed; wall thin, translucent, finely punctate, smooth; aperture terminal, central, at the end of a short tubular neck, usually with a phialine lip.

Length up to 0.50 mm.

Distribution.—Type-specimen (U.S.N.M. Cat. No. 17443) from *Albatross* station D2150, in 382 fathoms (697 meters), in the Caribspines; suture distinct, not depressed; wall smooth; aperture elongate with an entosolenian tube.

Length 0.08–0.10 mm.

Distribution.—Sidebottom originally described this minute species from the Mediterranean, off the coast of the Island of Delos, and Heron-Allen and Earland have recorded it from the Clare Island region as well as the following: *Goldseeker* dredgings from Noss Head (Moray Firth), Scapa Flow (Orkney Islands), and in the Minch.

This is a peculiar little species and seems almost like a young form of a larger species. The finding of it by Heron-Allen and Earland at numerous stations off the British Isles seems to show that it is a valid species with these peculiar characters. It has not occurred in the western Atlantic as far as I have seen.

LINGULINA PELLUCIDA Sidebottom.

Plate 17, fig. 10.

Lingulina pellucida Sidebottom, Mem. Proc. Manchester Lit. Philos. Soc., vol. 51, No. 9, 1907, p. 4, pl. 1, figs. 22–25; vol. 54, 1910, p. 20.—Heron-Allen and Earland, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 96, pl. 8, fig. 10; Journ. Roy. Micr. Soc., 1916, p. 47.—Sidebottom, Journ. Roy. Micr. Soc., 1918, p. 136.

Description.—Test longer than broad, compressed, especially in the later chambers, periphery rounded in transverse section; composed of 2 or 3 chambers, earlier one subglobular, the second and third much more compressed, the initial chamber oval, the second somewhat embracing and broader than the first, with a spine from each of the posterior angles of the periphery; chamber three may be of the same form or may be remote, with a short neck, with or without a spine developed in the second chamber; sutures distinct, depressed; wall smooth and finely punctate; aperture elliptical, at the end of a definite neck, with a phialine lip.

Length, 0.15–0.25 mm.

Distribution.—Sidebottom originally described this species from the Mediterranean, it being common off the Island of Delos in the Aegean Sea, and rare at the Bay of Palermo, Sicily. Heron-Allen and Earland have recorded typical specimens from off the coasts of the British Isles, in the Clare Island region, off Noss Head in the Moray Firth, and off the coast of South Cornwall. Sidebottom also records two specimens from the eastern coast of Australia in 465 fathoms (850 meters).

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Rhabdogonium H. B. BRADY (not Reuss), Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 524 (and subsequent authors).

Triplasia CUSHMAN (not Reuss), Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 62.

Description.—Test elongate, triangular in transverse section; the early chambers in an irregular spiral, later ones very loosely so or even uniserial; wall thin, translucent, finely punctate; aperture terminal not radiate, at the end of a short, often phialine lip.

The recent material which composes this genus has been referred to a number of genera. *Triplasia* of Reuss is based on Cretaceous species which are three-sided and seem to belong rather to the Textulariidae, possibly to *Tritaxia*. His name later changed by him to *Rhabdogonium*, on account of the finding of species polygonal in transverse section, is based on similar Cretaceous material.

The Recent material is different from these. It is more nearly allied to *Uvigerina* and *Siphogenerina* than to *Nodosaria*. The early development is similar to that of *Uvigerina* and the aperture is not of the radiate form seen in most of the *Nodosaria* group. A new genus has been erected for this. The Pacific species which I have called *Triplasia reussi* should be known as *Trifarina reussi* Cushman.

Type-species.—*Trifarina bradyi* Cushman, new species.

TRIFARINA BRADYI, new species.

Plate 22, figs. 3–9.

Rhabdogonium tricarinatum H. B. BRADY (not *Vaginulina tricarinata* d'Orbigny), Rep. Voy. *Challenger*, Zoology, vol. 9, 1884 p. 525, pl. 67, figs. 1–3; Journ. Roy. Micr. Soc., 1887, p. 910.—H. B. BRADY, PARKER, and JONES, Trans. Zool. Soc. London, vol. 12, 1888, p. 223, pl. 45, fig. 3.—WRIGHT, Ann. Mag. Nat. Hist., vol. 4, ser. 6, 1889, p. 449; Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 484.—EGGER, Abh. kön. bay. Akad. Wiss. München, Cl. II, vol. 18, 1893, p. 355, pl. 11, figs. 49, 50; pl. 12, figs. 36–38.

Description.—Test elongate, slightly tapering toward either end, often somewhat twisted, triangular in transverse section, with carinae at three angles, thin and fairly high, running from the initial end to the aperture, even onto the neck itself; chambers distinct, those of the earlier portion at least irregularly spiral, later ones less distinctly so; sutures distinct but not depressed; wall thin, translucent, finely punctate, smooth; aperture terminal, central, at the end of a short tubular neck, usually with a phialine lip.

Length up to 0.50 mm.

Distribution.—Type-specimen (U.S.N.M. Cat. No. 17443) from *Albatross* station D2150, in 382 fathoms (697 meters), in the Caribbean Sea. It has also occurred at several stations, as shown on the accompanying table. These cover fairly well the region from south of Cape Hatteras on the southeastern coast of the United States to Brazil, including the Gulf of Mexico and Caribbean. In his *Challenger* collections Brady had the species from off Bermuda, off the Lesser Antilles, off Brazil, and off the Canaries at depths from 350–1,360 fathoms (640–2,487 meters). It is also recorded from off the Abrohlos Bank, Brazil (H. B. Brady, Parker, and Jones); off the Irish coast, 100–1,000 fathoms (183–1,829 meters) (Wright; Balkwill and Wright); and from off the West Coast of Africa (Egger). The specimens of Balkwill and Wright are evidently not this species, and it may be that those of Wright were not. If so the species would be confined to the more restricted distribution given.

There are numerous records for the species from the Pacific, especially the South Pacific, and it may be that this species, like a number of others, has a wide range. A specimen which I have from the Gulf of Oman in 200 fathoms (366 meters) seems to be different from typical western Atlantic material, and specimens from the South Pacific and elsewhere should be examined and compared with typical material from the Atlantic.

While the species has previously been referred to *Vaginulina tricarinata* D'Orbigny, an examination of D'Orbigny's Modèle shows a form that can hardly be considered in connection with our Atlantic species. The arrangement of the chambers, the shape of the test, the angles, and the aperture are all very different.

There is almost no real variation in the characters of the species in the series of specimens I have had, nor in the specimens figured by Brady, or by Brady, Parker, and Jones, showing that the species is well defined. Its nearest relationships are with *Uvigerina*.

Trifarina bradyi—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
17442	U.S.N.M.	1	D2117....	15 24 20 N.; 63 31 30 W..	683	39.8	yl. m., fne. s.	Rare.
17443	U.S.N.M.	3	D2150....	13 34 45 N.; 81 21 10 W..	382	45.8	wh. crs. s....	Few.
17444	U.S.N.M.	2	D2355....	20 56 48 N.; 86 27 00 W..	399	....	yl. oz........	Rare.
17445	U.S.N.M.	2	D2395....	28 36 15 N.; 86 50 00 W..	347	44.1	gy. m.......	Rare.
17446	U.S.N.M.	1	D2396....	28 34 00 N.; 86 48 00 W..	335	....	gy. m.......	Rare.
17447	U.S.N.M.	1	D2398....	28 45 00 N.; 86 26 00 W..	227	48.6	gy. m.......	Rare.
17448	U.S.N.M.	2	D2614....	34 09 00 N.; 76 02 00 W..	168	....	gy. s., bk. sp.	Rare.
17449	U.S.N.M.	1	D2639....	25 04 50 N.; 80 15 10 W..	56	....	co. s.........	Rare.
17450	U.S.N.M.	3	D2677....	32 39 00 N.; 76 50 30 W..	478	39.3	gn. m.......	Few.
17451	U.S.N.M.	2	D2756....	3 22 00 S.; 37 49 00 W..	417	40.5	gy. s., bk. sp.	Rare.
17452	U.S.N.M.	1	....	Ragged Key, Fla.........	75	....	....	Rare.

Genus CRISTELLARIA Lamarck, 1812.

Nautilus (part) LINNAEUS, Syst. Nat., ed. 12, 1767, p. 1162.

Lenticulites (part) LAMARCK, Annales du Muséum, vol. 5, 1804, p. 188.

Cristellaria LAMARCK (type, *C. calcar* (Linnaeus)), Extrait Cours Zool., 1812, p. 122.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 534.—CHAPMAN, The Foraminifera, 1902, p. 193.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 63.

Description.—Test planospiral, typically close-coiled, but becoming much uncoiled in some species; chambers numerous; wall hyaline, perforate, variously ornamented; aperture usually distinctly radiate.

Typically this genus is close-coiled throughout, but various species are included under it in which the later chambers become uncoiled. It is often a question whether these species should be referred to *Cristellaria* or to *Marginulina*. Often in the uncoiled portion of such species the sutures between the chambers are oblique. There is great range of variation in the ornamentation of the test, which may be smooth or costate, the costae often breaking up into knobs and bosses, spines, or combinations of these, the sutures being frequently limbate, and the periphery often with a broad keel or ornamented by a series of spines. The aperture is almost always radiate, and in some species the apertures of the preceding chambers are visible, giving a peculiar appearance to such specimens.

The genus is recorded as far back as the Cambrian and is very abundant in the Cretaceous and in certain portions of the Tertiary. In the present oceans it is widely distributed, both geographically and bathymetrically. It reaches a very great development, especially in the number of species, in tropical waters from 100–500 fathoms (183–914 meters) in depth, and in cold waters of similar depths, while the species are not so numerous, specimens are often very abundant. The greatest ornamentation is seen in tropical species.

CRISTELLARIA ORBICULARIS (D'Orbigny)?

Plate 21, fig. 7.

Brady records this species from off Sombrero Island, West Indies, 450 fathoms (823 meters) and had several stations in the South Pacific. I have specimens from a single *Albatross* station off the coast of Georgia, one which is here figured and is apparently similar to the form which Brady had from the West Indies. Flint records it from the Gulf of Mexico, 169 and 210 fathoms (308 and 384 meters). There are numerous other records for the species, all from the Indo-Pacific. It is therefore to be doubted whether this species is really identical with that described by D'Orbigny from the Tertiary of Central Italy.

Cristellaria orbicularis?—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
18971	U.S.N.M.	4	D2415....	30 44 00 N.; 79 26 00 W..	440	45.6	crs. s........	Few.

CRISTELLARIA D'ORBIGNII (Bailey).

Plate 22, fig. 1; pl. 26, fig. 3.

Robulina d'orbignii Bailey, Smithsonian Contrib., vol. 2, 1851, p. 10, pl., figs. 9, 10.

Description.—Test close-coiled, compressed, periphery with a slight blunt keel; chambers comparatively few, 8–10 in the last-formed coil, distinct, but very slightly inflated, often more so toward the later chambers; sutures distinct, very slightly if at all depressed, straight, generally radiate, apertural face truncated, the sides somewhat thickened and keeled; aperture at the peripheral angle, radiate, only slightly projecting; surface smooth.

Diameter up to 4 mm.

Distribution.—This species was originally described and figured by Bailey from dredgings off the northeastern coast of the United States, in the same region from which much of the *Albatross* dredgings used in the present paper were obtained. It somewhat resembles *Cristellaria occidentalis* Cushman, but has a more rounded form, is larger, and its general appearance very different. The stations range from the latitude of Cape Cod southward nearly to Cape Hatteras. Specimens are not nearly so abundant as are those of *Cristellaria occidentalis.*

Cristellaria d'orbignii—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
18798	U.S.N.M.	2	D2203....	39 34 15 N.; 71 41 15 W..	705	38.9	gn. m., s....	Rare.
18799	U.S.N.M.	4	D2682....	39 38 00 N.; 70 22 00 W..	990	....	gn. m.......	Few.
18800	U.S.N.M.	1	D2731....	36 45 00 N.; 74 28 00 W..	781	....	gy. oz.......	Rare.
18801	U.S.N.M.	1	*Fish Hawk* 949.	....	....	....	....	Rare.

CRISTELLARIA OCCIDENTALIS, new species.

Plate 25, fig. 2; pl. 26, figs. 1, 2.

Cristellaria reniformis Flint (part) (not D'Orbigny), Rep. U. S. Nat. Mus., 1897 (1899), p. 315, pl. 62, fig. 2.

Description.—Test for the most part close-coiled, compressed, composed of comparatively few chambers, 6–8 in the last-formed coil, periphery carinate or angled, apertural face of the last-formed chamber squarely truncate or even slightly concave, the sides angled, the apertural end projecting; sutures fairly distinct, in the later chambers slightly depressed, nearly straight, generally radiate; aperture radiate, at the end of the peripheral projection of the last-formed chamber.

Length up to 2.50 mm.

Distribution.—Type-specimen (U.S.N.M. Cat. No. 18785) from *Albatross* station D2041, in 1608 fathoms (2940 meters), off the northeastern coast of the United States. This species is common, often abundant, at *Albatross* stations south of latitude 40° N., off the northeastern coast of the United States, with a few stations south of Cape Hatteras, off the coasts of Carolina and Georgia. Several of the stations from which Flint records *Cristellaria reniformis* are in this same general area. The species is very different from *C. reniformis* as described by D'Orbigny, and seems to be one of the more characteristic and abundant species off the eastern coast of the United States.

Cristellaria occidentalis—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
18781	U.S.N.M.	1	D2003	37 16 30 N.; 74 20 36 W.	641	......	......	Rare.
18782	U.S.N.M.	1	D2018	37 12 22 N.; 74 20 04 W.	788	39.0	bu. m.	Rare.
18783	U.S.N.M.	1	D2035	39 26 16 N.; 70 02 37 W.	1,362	......	glob. oz	Rare.
18784	U.S.N.M.	9	D2037	38 53 00 N.; 69 23 30 W.	1,731	38.0	glob. oz.	Common.
18785	U.S.N.M.	1	D2041	39 22 50 N.; 68 25 00 W.	1,608	38.0	glob. oz.	Abundant.
18786	U.S.N.M.	10+						
18787	U.S.N.M.	10+	D2042	39 33 00 N.; 68 26 45 W.	1,555	38.5	glob. oz.	Abundant.
18788	U.S.N.M.	8	D2043	39 49 00 N.; 68 28 30 W.	1,467	38.5	glob. oz.	Common.
18789	U.S.N.M.	3	D2105	37 50 00 N.; 73 03 50 W.	1,395	41.0	glob. oz.	Few.
18790	U.S.N.M.	1	D2174	38 15 00 N.; 72 03 00 W.	1,594	......	gy. m.	Rare.
18791	U.S.N.M.	2	D2202	39 38 00 N.; 71 39 45 W.	515	39.1	gn. m.	Rare.
18792	U.S.N.M.	1	D2219	39 46 22 N.; 69 29 00 W.	948	38.8	gy. m.	Rare.
18793	U.S.N.M.	1	D2228	37 25 00 N.; 73 06 00 W.	1,582	36.8	br. m.	Rare.
18794	U.S.N.M.	2	D2231	38 29 00 N.; 73 09 00 W.	965	36.8	gy. oz.	Rare.
18795	U.S.N.M.	1	D2416	31 26 00 N.; 79 07 00 W.	276	53.8	co., brk. sh.	Rare.
18796	U.S.N.M.	1	D2678	32 40 00 N.; 76 40 30 W.	731	38.7	lt. gy. oz.	Rare.
18797	U.S.N.M.	1	D2679	32 40 00 N.; 76 40 30 W.	782	38.6	lt. gy. oz.	Rare.

CRISTELLARIA OCCIDENTALIS, new species, var. GLABRATA, new variety.

Plate 25, fig. 3.

Description.—Variety differing from the typical in the more circular form, very smoothly finished surface, the sutures being distinct but not disturbing the very even polished character of the surface, about 10 chambers in the last-formed coil, the periphery angled, very slightly carinate.

Diameter up to 3 mm.

Distribution.—Type-specimen (U.S.N.M. Cat. No. 18823) from *Albatross* station D2541, in 134 fathoms (245 meters), off the northeastern coast of the United States. This variety occurs in the same general region as the typical form, but is easily distinguished from it. The surface is peculiarly smooth and uniform, the sutures, though distinct, are neither raised above or depressed below the surface, and the generally smooth polished character is continued over all the chambers, and from the umbo to the periphery.

Cristellaria occidentalis, var. glabrata—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
18819	U.S.N.M.	1	D2046....	40 02 49 N.; 68 49 00 W..	407	40.0	bu. m.......	Rare.
18820	U.S.N.M.	10+	D2243....	40 10 15 N.; 70 26 00 W..	63	52.4	gn. m.......	Abundant.
18821	U.S.N.M.	8	D2425....	36 20 24 N.; 76 46 30 W..	119	51.5	dk. gy. m...	Frequent.
18822	U.S.N.M.	1	D2539....	39 59 45 N.; 70 53 00 W..	133	47.7	gn. s........	Rare.
18823	U.S.N.M.	1	D2541....	39 57 45 N.; 70 50 30 W..	134	47.7	gn.s.........	Frequent.
18824	U.S.N.M.	7						
18825	U.S.N.M.	5	D2544....	40 01 45 N.; 70 24 00 W..	131	47.7	gn. s........	Frequent.
18826	U.S.N.M.	2	D2555....	39 53 00 N.; 71 32 00 W..	136	47.7	gn. m., s....	Rare.

CRISTELLARIA OCCIDENTALIS, new species, var. NOVANGLIAE, new variety.

Plate 23, fig. 1; pl. 24, fig. 1.

Description.—Variety differing from the typical in the larger size of the test, the broad keel extending nearly the whole circumference of the test, showing lines of growth from each chamber, chambers about 8 in the last-formed coil.

Diameter up to 5 mm.

Distribution.—Type-specimen (U.S.N.M. Cat. No. 18926) from *Albatross* station D2237, in 520 fathoms (951 meters), southeast of Nantucket. This is an abundant variety dredged by the *Albatross* off the coast of New England. At first glance it might seem to be quite different from *Cristellaria occidentalis*, but a study of abundant specimens shows that they probably belong to one species.

Cristellaria occidentalis, var. novangliae—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
3121	U.S.N.M.	1	D2037....	38 53 00 N.; 69 23 30 W..	1,731	38.0	glob. oz.....	Rare.
18919	U.S.N.M.	10+	D2171....	37 59 30 N.; 73 48 40 W..	444	39.5	gn. m.......	Abundant.
18920	U.S.N.M.	8	D2172....	38 01 15 N.; 73 44 00 W..	568	39.0	gn. m.......	Common.
18921	U.S.N.M.	10+	D2202....	39 38 00 N.; 71 39 45 W..	515	39.1	gn. m.......	Abundant.
18922	U.S.N.M.	4	D2203....	39 34 15 N.; 71 41 15 W..	705	38.9	gn. m., s....	Few.
18923	U.S.N.M.	3	D2212....	39 59 30 N.; 70 30 45 W..	428	40.0	gn. m.......	Few.
18924	U.S.N.M.	10+	D2213....	39 58 30 N.; 70 30 00 W..	384	39.5	gn. m.......	Abundant.
18925	U.S.N.M.	10+	D2214....	39 57 00 N.; 70 32 00 W..	475	39.5	gn. m.......	Abundant.
18926	U.S.N.M.	10+	D2237....	39 12 17 N.; 72 09 30 W..	520	39.5	gn. m.......	Abundant.
18927	U.S.N.M.	7	D2504....	44 23 00 N.; 61 22 45 W..	82	40.6	bk. m., g....	Frequent.
18928	U.S.N.M.	6	D2552....	39 47 07 N.; 70 35 00 W..	721	39.6	gy. oz.......	Frequent.

CRISTELLARIA OCCIDENTALIS, new species, var. TORRIDA, new variety.

Plate 25, fig. 1.

Description.—Variety differing from the typical in the very translucent character of the test and the keel which is thin and transparent, 7 or 8 chambers in the last-formed coil, the aperture not distinctly projecting as in the typical.

Diameter up to 2 mm.

Distribution.—Type-specimen (U.S.N.M. Cat. No. 18813) from *Albatross* station D2377, in 210 fathoms (384 meters), in the northern part of the Gulf of Mexico. It has also occurred at other stations in this same region, off the southern coast of Florida, and at two stations south of Cape Hatteras on the Atlantic coast, thus following the distribution of numerous other species of the Lagenidae. This is probably the form recorded by Flint as *Cristellaria reniformis* from stations D2377 and D2385 from the Gulf of Mexico. At least one of Flint's specimens which he records as *Cristellaria cultrata* (Rep. U. S. Nat. Mus., 1897 (1899), pl. 65, fig. 2, right-hand specimen) is probably this variety.

Cristellaria occidentalis, var. torrida—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
18812	U.S.N.M.	2	D2115....	35 49 30 N.; 74 34 45 W..	843	39.0	m., fne. s....	Rare.
18813	U.S.N.M.	1	D2377....	29 07 30 N.; 88 08 00 W..	210	67.0	gy. m.......	Rare.
18814	U.S.N.M.	1						
18815	U.S.N.M.	1	D2393....	28 43 00 N.; 87 14 30 W..	525	41.1	lt. gy. m....	Rare.
18816	U.S.N.M.	1	D2394....	28 38 30 N.; 87 02 00 W..	420	41.8	gn. m.......	Rare.
18817	U.S.N.M.	1	D2639....	25 04 50 N.; 80 15 10 W..	56	....	co. s.........	Rare.
18818	U.S.N.M.	1	D2678....	32 40 00 N.; 76 40 30 W..	731	38.7	lt. gy. oz....	Rare.

CRISTELLARIA GIBBA D'Orbigny.

Plate 25, fig. 4.

Cristellaria gibba D'Orbigny, Ann. Sci. Nat., vol. 7, 1826, p. 292, No. 17; in De la Sagra, Hist. Fis. Pol. Nat. Cuba, "Foraminifères," 1839, p. 63, pl. 7, figs. 20, 21.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 546, pl. 69, figs. 8, 9.—Pearcey, Trans. Glasgow Nat. Hist. Soc., vol. 2, 1890, p. 178.—Woodward, The Observer, vol. 4, 1893, p. 144.—Egger, Abh. kön. bay. Akad. Wiss. München, Cl. II, vol. 18, 1893, p. 352, pl. 12, figs. 21, 27, 39.—Goës, Bull. Mus. Comp. Zoöl., vol. 29, 1896, p. 55.—Flint, Rep. U. S. Nat. Mus., 1897 (1899), p. 317, pl. 64, fig. 1.—Chapman, The Foraminifera, 1902, p. 403.—Millett, Journ. Roy. Micr. Soc., 1902, p. 255.—Earland, Journ. Quekett Micr. Club, ser. 2, vol. 9, No. 57, 1905, p. 216.—Chapman, Subantarctic Ids. N. Zealand, 1909, p. 344.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 69, pl. 35, fig. 1.—Heron-Allen and Earland, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 99; Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 263.—Mestayer, Trans. N. Zealand Inst., vol. 48, 1916, p. 129.—Chapman, Rep. Sci. Invest., 1916 (1917), p. 44, pl. 5, fig. 8.—Cushman, Proc. U. S. Nat. Mus., vol. 56, 1919, p. 615.

Description.—Test close-coiled, somewhat longer than broad, 7 or 8 chambers in the last-formed coil, periphery slightly keeled or at least acute, apertural face broad and truncate, triangular; chambers not inflated; sutures curved, very slightly if at all depressed; wall smooth; aperture radiate at the periphery.

Length, up to 1 mm.

Distribution.—This species was originally described by D'Orbigny from the Antilles. It is a small, not very conspicuous species. There are numerous records for it in the western Atlantic. Brady records it from the *Challenger* collections from off Sombrero and Culebra Islands, and off Bermuda, and also off the southeastern coast of South America. Flint recorded it from several stations along the eastern coast of the United States, in the Gulf of Mexico, and in the Caribbean, and Goës also records it from the Gulf of Mexico. I have had numerous specimens which can be referred to this species from the Caribbean and the Gulf of Mexico and the eastern coast of the United States. From the eastern side of the Atlantic it is recorded by Pearcey in the warm area of the Faroe Channel, by Earland from off Bognor, Sussex, and by Heron-Allen and Earland from the Clare Island region and from the west of Scotland. Specimens on the coast of England, however, are recorded as very rare. Most of the other records for the species are from moderate depths in the Indo-Pacific. The specimens that I have figured as this species from the Philippines do not belong here.

Cristellaria gibba—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
18941	U.S.N.M.	1	D2035....	39 26 16 N.; 70 02 37 W..	1,362	....	glob. oz.....	Rare.
18942	U.S.N.M.	1	D2117....	15 24 20 N.; 63 31 30 W..	683	39.8	yl. m., fne. s.	Rare.
18943	U.S.N.M.	1	D2172....	38 01 15 N.; 73 44 00 W..	568	39.0	gn. m.......	Rare.
18944	U.S.N.M.	1	D2231....	38 29 00 N.; 73 09 00 W..	965	36.8	gy. oz.......	Rare.
18945	U.S.N.M.	1	D2352....	22 35 00 N.; 84 23 00 W..	463	45.0	wh. co......	Rare.
18946	U.S.N.M.	1	D2377....	29 07 30 N.; 88 08 00 W..	210	67.0	gy. m.......	Rare.
18947	U.S.N.M.	1	D2396....	28 34 00 N.; 86 48 00 W..	335	....	gy. m.......	Rare.
18948	U.S.N.M.	1	D2398....	28 45 00 N.; 86 26 00 W..	227	48.6	gy. m.......	Rare.
18949	U.S.N.M.	2	D2400....	28 41 00 N.; 86 07 00 W..	169	....	gy. m.......	Rare.
18950	U.S.N.M.	2	D2542....	40 00 15 N.; 70 42 20 W..	129	47.2	s., brk. sh...	Rare.

CRISTELLARIA CONVERGENS Bornemann?

Plate 36, figs. 1–4.

There are a few *Challenger* stations in the Atlantic from which this species is recorded, one in the western Atlantic, off Culebra Island, 390 fathoms (713 meters), one off the coast of Brazil, 675 fathoms (1,234 meters), and two others in deep water, one just south of the Equator, and the other southeast of the Azores. Pearcey has recorded it from deep water in the South Atlantic. The only European specimens seem to be those recorded by Heron-Allen and Earland from off the west of Scotland.[60] I have had very few specimens in the western Atlantic *Albatross* material which could be referred to this species. These are from the Gulf of Mexico, and the eastern coast of the United States. One of the most nearly typical is here figured.

Cristellaria convergens—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
18951	U.S.N.M.	1	D2037....	38 53 00 N.; 69 23 30 W..	1,731	38.0	glob. oz.....	Rare.
18952	U.S.N.M.	1	D2052....	39 40 05 N.; 69 21 25 W..	1,098	45.0	glob. oz.....	Rare.
18953	U.S.N.M.	1	D2377....	29 07 30 N.; 88 08 00 W..	210	67.0	gy. m.......	Rare.
18954	U.S.N.M.	1	D2415....	30 44 00 N.; 79 26 00 W..	440	45.6	crs. s., sh., for.	Rare.

CRISTELLARIA SEPTENTRIONALIS, new species.

Plate 27, figs. 1, 2.

Description.—Test comparatively large, close-coiled, much compressed, periphery subacute, not keeled; chambers numerous, 15–18 in the last-formed coil, not inflated; sutures curved, especially toward the periphery where they are somewhat raised above the general surface; umbo raised, large; wall smooth; aperture at the peripheral angle, radiate.

Diameter up to 4 mm.

Distribution.—Type-specimen (U.S.N.M. Cat. No. 18956) from *Albatross* station D2202, in 515 fathoms (942 meters), off the northeastern coast of the United States. I have had numerous specimens of this species, all from the general region northeastward from Cape Hatteras. It is distinguished by its large size, prominent umbo, large number of chambers in the last-formed coil, and peculiar curvature of the sutures.

Cristellaria septentrionalis—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
18955	U.S.N.M.	1	D2171....	37 59 30 N.; 73 48 40 W..	444	39.5	gn. m.......	Rare.
18956	U.S.N.M.	1	D2202....	39 38 00 N.; 71 39 45 W..	515	39.1	gn. m.......	Rare.
18957	U.S.N.M.	1	D2212....	39 59 30 N.; 70 30 45 W..	428	40.0	gn. m.......	Rare.
18958	U.S.N.M.	1	D2214....	39 57 00 N.; 70 32 00 W..	475	39.5	gn. m.......	Rare.
18959	U.S.N.M.	2	D2237....	39 12 17 N.; 72 09 30 W..	520	39.5	gn. m.......	Rare.
18960	U.S.N.M.	1	D2263....	37 08 00 N.; 74 33 00 W..	430	....	gn. m.......	Rare.
18961	U.S.N.M.	1	D2544....	40 01 45 N.; 70 24 00 W..	131	47.7	gn. s., bk. sp	Rare.
18962	U.S.N.M.	2	D2547....	39 54 30 N.; 70 20 00 W..	390	39.6	gn. m.......	Rare.
18963	U.S.N.M.	1	D2677....	32 39 00 N.; 76 50 30 W..	478	39.3	gn. m.......	Rare.
18964	U.S.N.M.	6	D2682....	39 38 00 N.; 70 22 00 W..	990	....	gn. m.......	Frequent.
18965	U.S.N.M.	1	D2689....	39 42 00 N.; 71 15 30 W..	525	....	gn. m.......	Rare.

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[60] Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 262, pl. 42, figs. 11–14.

CRISTELLARIA ROTULATA (Lamarck)?

Plate 22, fig. 2, pl. 28, figs. 1, 2.

Description.—Test comparatively large, close-coiled, strongly umbonate, carinate or the periphery angled, the last-formed coil composed of few, not usually more than 7 or 8, chambers; sutures distinct, straight, not extending to the center of the test, but to the umbo so that each chamber overlaps the preceding; surface smooth throughout; aperture at the peripheral angle of the test, large, radiate.

Diameter up to 2.50 mm.

Distribution.—I have limited the name *Cristellaria rotulata* to this simple type composed of a few chambers, with very large umbonate center, and the sutures of a peculiar type, shown in plate 28, figure 2. Such specimens are found especially in the Gulf of Mexico, Caribbean, and in the warmer portions of the western Atlantic. They also occur in the Tertiary of the Gulf Coastal Plain of the United States. Such specimens are also found in the Indo-Pacific and are probably related to these. Also in the Gulf of Mexico there are found specimens more like those figured by Brady as *Cristellaria rotulata.*[61] This has many more chambers, the sutures are curved, and their arrangement where they impinge against the central umbo is different. Such forms may possibly be varieties of *Cristellaria iota* Cushman which lack the peripheral keel.

Cristellaria rotulata—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
18929	U.S.N.M.	1	D2109....	35 14 20 N.; 74 59 10 W..	142	50.5	bu. m.......	Rare.
18930	U.S.N.M.	4	D2150....	13 34 45 N.; 81 21 10 W..	382	45.8	wh. crs. s....	Few.
18931	U.S.N.M.	10+	D2377....	29 07 30 N.; 88 08 00 W..	210	67.0	gy. m.......	Abundant.
18932	U.S.N.M.	3	D2399....	28 44 00 N.; 86 18 00 W..	196	51.6	gy. m.......	Few.
18933	U.S.N.M.	1	D2581....	39 43 00 N.; 71 34 00 W..	394	....	gn. m.......	Rare.
18934	U.S.N.M.	1	D2644....	25 40 00 N.; 80 00 00 W..	193	43.4	gy. s........	Rare.

CRISTELLARIA VORTEX Fichtel and Moll.

There are a few records for this species from both sides of the Atlantic. Brady records it from off Bermuda at 435 fathoms (796 meters), Goës records it as scarce in the Caribbean Sea, 130 fathoms (238 meters), and Flint from the Caribbean and the eastern coast of the United States in 130 and 276 fathoms (238 and 505 meters).

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[61] Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, pl. 69, fig. 13.

From the European side Balkwill and Wright record a single specimen from off Ireland's Eye, 7–9 fathoms (13–16 meters), Brady "small starved specimens doubtfully referable to this species" from the west of Scotland, and Heron-Allen and Earland[62] from off South Cornwall. I have failed to find good typical material in the *Albatross* collections that I have examined.

CRISTELLARIA SUBMAMILLIGERA Cushman.

Plate 28, fig. 3.

Cristellaria mamilligera H. B. BRADY (not Karrer), Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 553, pl. 70, figs. 17, 18.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 74, pl. 34, fig. 6*a* (not 6*b*, which should read 5*b*).

Cristellaria submamilligera CUSHMAN, Proc. U. S. Nat Mus., vol. 51, 1917, p. 657; Bull. 100, U. S. Nat. Mus., vol. 4, 1921, p. 235.

Description.—Test biconvex, close-coiled, periphery with a thin keel; sutures curved, limbate externally, ornamented by a raised ridge which ends near the umbilical region in a protuberant knob, often a distinct raised boss over the center of the umbilical region; keel entire and not denticulate in well-preserved specimens; wall between the raised ridges, smooth; aperture radiate.

Diameter of Atlantic specimen 2 mm.

Distribution.—This species described from the Philippine region has a fairly broad distribution in the Indo-Pacific region. I had it from many stations in the Philippines and Brady records it from the Philippines and Fiji. Chapman records it from off Great Barrier Island. It is interesting, therefore, to find a single well-developed specimen from the northern part of the Gulf of Mexico where numerous other Indo-Pacific species have been found. In the Summary of Results of the *Challenger* Expedition the species is recorded from off the southeastern coast of South America, off the mouth of the Rio la Plata. This is a peculiar distribution and the specimens should be reexamined.

Cristellaria submamilligera—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
18979	U.S.N.M.	1	D2378....	29 14 30 N.; 88 09 30 W..	68	....	gy. m.......	Rare.

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[62] Journ. Roy. Micr. Soc., 1916, p. 48.

CRISTELLARIA FORMOSA, new species.

Plate 29, fig. 1; pl. 30, fig. 6.

Cristellaria calcar H. B. Brady (part) (not Linnaeus), Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 551, pl. 70, figs. 13, 14.—FLINT (part), Rep. U. S. Nat. Mus., 1897 (1899), p. 318, pl. 66, fig. 1 (central figure).

Description.—Test large, close-coiled, somewhat compressed, central portion strongly umbonate, periphery with a thin keel and flattened rowel-like spines; chambers numerous, 11–13 in the last-formed coil; sutures distinct, slightly limbate, of clear shell material, not raised, much curved; surface smooth, central portion occupied by a large somewhat projecting boss of clear shell material through which the chambers of the earlier coils are visible; aperture peripheral, radiate, slightly projecting.

Diameter up to 3 mm.

Distribution.—Type-specimen (U.S.N.M. Cat. No. 18807) from *Albatross* station D2377, in 210 fathoms (384 meters), in the northern part of the Gulf of Mexico. Flint gives this same station among his records for *Cristellaria calcar.* I have also a single specimen from *Albatross* station D2150, in the Caribbean.

It is interesting in this connection to note that in his records for the occurrence of *Cristellaria calcar*, Brady mentions three stations in the northern Atlantic at which good specimens have been found—off Sombrero Island, West Indies, 450 fathoms (823 meters), off Culebra Island, 390 fathoms (713 meters), and off the Azores, 450 fathoms (823 meters). His figures (pl. 70, figs. 13, 14) are of the typical form seen in the Gulf of Mexico, and from the identity of most of the species at the two *Challenger* West Indian stations noted and those of the Gulf of Mexico, it may be supposed that the two figures given by Brady were from one or the other of these two stations. It is a very different species from the others which have been assigned to *Cristellaria calcar.* The number of chambers, the compact form, the flattened rowel-like spines and the clear boss of shell material are enough to distinguish it from most of the other species assigned to *Cristellaria calcar.*

Cristellaria formosa—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
18806	U.S.N.M.	1	D2150....	13 34 45 N.; 81 21 10 W..	382	45.8	wh. crs. s....	Rare.
18807	U.S.N.M.	1	D2377....	29 07 30 N.; 88 08 00 W..	210	67.0	gy. m.......	Rare.

CRISTELLARIA IOTA, new species.

Plate 29, fig. 2; pl. 30, fig. 1.

Cristellaria cultrata H. B. Brady (not Montfort), Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 550, pl. 70, figs. 4–6.

Description.—Test close-coiled, compressed, umbonate, the periphery with a thin broad keel, nearly transparent, 13–15 chambers in the last-formed coil, narrow; sutures slightly curved, very slightly limbate, but not raised above the general surface, umbonal region occupied by a large thickened transparent knob; wall smooth, thin; aperture radiate, at the peripheral angle of the test, those of the early chambers distinct throughout the last-formed coil.

Diameter up to 2.50 mm. without the keel.

Distribution.—Type-specimen (U.S.N.M. Cat. No. 18939) from *Albatross* station D2399, in 196 fathoms (359 meters), in the northern part of the Gulf of Mexico. I have a single specimen also from an *Albatross* station in the Caribbean. It would be interesting to know the station from which Brady's specimens figured in the *Challenger* report came. However, as the species is recorded from both stations 23 and 24, off Sombrero and Culebra Islands, and as these specimens are so similar to those in the Gulf of Mexico and Caribbean, they may have come from one of these stations. This was referred to *Cristellaria cultrata* Montfort by Brady. There are numerous records for *C. cultrata* Montfort, many of them from the Atlantic, especially off the British Isles, but figures are not given, and I doubt very much if this species which seems to be rather widely distributed in the warmer western Atlantic is found on the shores of the British Isles.

Cristellaria iota—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
18938	U.S.N.M.	1	D2144....	9 49 00 N.; 79 31 30 W..	896	....	gn. m.......	Rare.
18939	U.S.N.M.	1	D2399....	28 44 00 N.; 86 18 00 W..	196	51.6	gy. m.......	Rare.
18940	U.S.N.M.	1						

CRISTELLARIA LUCIDA, new species.

Plate 30, fig. 2.

Cristellaria articulata H. B. Brady (not Reuss), Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 547, pl. 69, figs. 10–12.—Flint (part), Rep. U. S. Nat. Mus., 1897 (1899), p. 317, pl. 64, fig. 2.

Description.—Test close-coiled, somewhat compressed, umbilical region not umbonate, periphery slightly keeled, 6 or 7 chambers in the last-formed coil, somewhat inflated, periphery slightly lobulated; sutures distinct, very slightly if at all depressed, nearly straight and radiate, central portion of the test often transparent, showing the earlier coils; apertural end projecting, truncate; aperture radiate, sometimes with an elongate elliptical opening at the top of the somewhat truncated apertural face.

Diameter up to 2.25 mm.

Distribution.—Type-specimen (U.S.N.M. Cat. No. 18993) from *Albatross* station D2544, in 131 fathoms (240 meters), off the southeastern coast of the United States. There are numerous specimens of this form, ranging from the latitude of Cape Cod southward, and into the Gulf of Mexico. Flint's specimens are also from this same general region. Brady records this species as *Cristellaria articulata* Reuss, but a reference to the original figures of Reuss will show that the two are not identical. Brady mentions that fine examples of *C. articulata* occur in the dredged sands from off Culebra Island, 390 fathoms (713 meters), and it is to be suspected that his figured specimens came from this station. He also figures (pl. 69, figs. 1–4) what he called wild-growing forms which came from off Nightingale Island, Tristan da Cunha, 100–150 fathoms (183–274 meters). Although specimens from both these localities were referred to the same species by Brady, a reference to the plates will show how different are the two forms. Our species has a very different form, a very peculiar apertural region, and is very constant in the character of the chambers, the sutures, and the general form. In the Summary of Results of the *Challenger* Expedition, the species is also recorded from off Bermuda and at other stations from Spain to the Canary Islands, and in the southern Atlantic, but from a study of western Atlantic species and their distributions it is probable that there is distributed in the warmer portion of the western Atlantic a distinct species to which I have here given a definite name. Its affinities are to be looked for rather in the Indo-Pacific.

Cristellaria lucida—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
18981	U.S.N.M.	3	D2109....	35 14 20 N.; 74 59 10 W..	142	50.5	bu. m.......	Few.
18982	U.S.N.M.	1	D2214....	39 57 00 N.; 70 32 00 W..	475	39.5	gn. m.......	Rare.
18983	U.S.N.M.	1	D2231....	38 29 00 N.; 73 09 00 W..	965	36.8	gy. oz.......	Rare.
18984	U.S.N.M.	1	D2242....	40 15 30 N.; 70 27 00 W..	58	51.4	gn. m.......	Rare.
18985	U.S.N.M.	3	D2265....	37 07 40 N.; 74 35 40 W..	70	57.9	gn. m., g....	Few.
18986	U.S.N.M.	4	D2309....	35 43 30 N.; 74 52 00 W..	56	....	gy. s........	Few.
18987	U.S.N.M.	2	D2313....	32 53 00 N.; 77 53 00 W..	99	57.2	crs. s., bk. sp.	Rare.
18988	U.S.N.M.	1	D2314....	32 43 00 N.; 77 51 00 W..	159	47.4	crs. s., bk. sp.	Rare.
18989	U.S.N.M.	1	D2399....	28 44 00 N.; 86 18 00 W..	196	51.6	gy. m.......	Rare.
18990	U.S.N.M.	3	D2415....	30 44 00 N.; 79 26 00 W..	440	45.6	crs. s., sh., for.	Few.
18991	U.S.N.M.	7	D2416....	31 26 00 N.; 79 07 00 W..	276	53.8	co., brk. sh..	Frequent.
18992	U.S.N.M.	10+	D2425....	36 20 24 N.; 76 46 30 W..	119	51.5	dk. gy. m., fne. s.	Abundant.
18993	U.S.N.M.	1	D2544....	40 01 45 N.; 70 24 00 W..	131	47.7	gn. s., bk. sp.	Few.
18994	U.S.N.M.	3						

CRISTELLARIA PEREGRINA Schwager.

Plate 30, figs. 3, 4.

Cristellaria peregrina SCHWAGER, *Novara*-Exped., Geol. Theil., vol. 2, 1866, p. 245, pl. 7, fig. 89.

Cristellaria variabilis H. B. BRADY (not Reuss), Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 541, pl. 68, figs. 11–16; Journ. Roy. Micr. Soc., 1887, p. 912.—H. B. BRADY, PARKER, and JONES, Trans. Zool. Soc. London, vol. 12, 1888, p. 224, pl. 44, fig. 12.—WRIGHT, Ann. Mag. Nat. Hist., vol. 4, ser. 6, 1889, p. 449; Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 485.—WOODWARD, The Observer, vol 4, 1893, p. 144.—EGGER, Abh. kön. bay. Akad. Wiss. München, Cl. II, vol. 18, 1893, p. 353, pl. 11, figs. 61, 62; pl. 12, figs. 16–18.—Goës, Bull. Mus. Comp. Zoöl., vol. 29, 1896, p. 58.—FLINT, Rep. U. S. Nat. Mus., 1897 (1899), p. 316, pl. 63, fig. 1.—CHAPMAN, Journ. Linn. Soc. Zool., vol. 28, 1902, p. 403.—MILLETT, Journ. Roy. Micr. Soc., 1903, p. 256, pl. 5, fig. 1.—SIDEBOTTOM, Mem. Proc. Manchester Lit. Philos. Soc., vol. 51, No. 9, 1907, p. 8, pl. 2, fig. 3.—CHAPMAN, Subantarctic Ids. N. Zealand, 1909, p. 343; Journ. Linn. Soc. Zool., vol. 30, 1910, p. 413.—SIDEBOTTOM, Mem. Proc. Manchester Lit. Philos. Soc., vol. 54, No. 16, 1910, p. 21.—HERON-ALLEN and EARLAND, Trans. Linn. Soc. London, ser. 2, vol. 2, 1916, p. 263.—MESTAYER, Trans. N. Zealand Inst., vol. 48, 1916, p. 129.—SIDEBOTTOM, Journ. Roy. Micr. Soc., 1918, p. 141, pl. 5, fig. 8.—CUSHMAN, Proc. U. S. Nat. Mus., vol. 56, 1919, p. 615.

Description.—Test small, compressed, in the adult longer than broad, with a thin peripheral keel, in the young stages the test is close-coiled, usually with a peripheral keel; chambers usually three in the coil, overlapping, the apertural end slightly produced; aperture radiate but not projecting, in later development the last-formed chambers become somewhat more inflated and the sutures depressed, a thin peripheral keel is developed, running from the aperture around the test, the aperture itself terminal, produced, surrounded by a ring of spinose projections; wall thin, transparent, smooth.

Length usually less than 0.50 mm.

Distribution.—There are numerous Atlantic records for this species, as follows: From *Challenger* material Brady records it from off the coast of Brazil, off the eastern coast of the United States, off the West Indies, off the Azores, and off the Canaries. Wright records it from 100–1,000 fathoms (183–1,829 meters), off the southwest of Ireland; Brady, Parker, and Jones, from the Abrohlos Bank, 40 and 260 fathoms (73 and 476 meters); Goës records it from the northern part of the Gulf of Mexico, the Caribbean, and the North Sea; Egger from off the western coast of Africa. Flint had it from several *Albatross* stations in the Caribbean off Panama, three stations in the northern part of the Gulf of Mexico, and two off the eastern coast of the United States. Heron-Allen and Earland record a single small typical specimen from the west of Scotland. In the *Albatross* material that I have examined it has occurred at numerous stations; off the northeastern coast of the United States, up to latitude 41° N., southward into the Gulf of Mexico, the Caribbean, and one station off southeastern Brazil.

From a study of the original figures and description of *Cristellaria variabilis* Reuss, it does not seem to me that our common recent species is the same as that described by Reuss from the Miocene of Central Europe. Our specimens usually have only three chambers in the coiled portion and one or two in the later development, the sutures being straight and the general form of the test peculiar. These characters do not occur in Reuss's figure and his description does not indicate them. *Cristellaria peregrina* as figured by Schwager is undoubtedly the adult of this species, especially of the form which is common in the Pacific. I have given a series of figures showing the development of the species and allowing for the change from the close-coiled test with three chambers in a whorl to the adult character of a peripheral keel, somewhat inflated chambers, and terminal aperture. The amount of variation outside of the changes in development are not great. There is often a small chamber developed in senescent specimens, as is shown in some of the figures.

Cristellaria peregrina—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
18827	U.S.N.M.	1	D2078....	41 11 30 N.; 66 12 20 W..	499	40.0	gy. m., s....	Rare.
18828	U.S.N.M.	2	D2084....	40 16 50 N.; 67 05 15 W..	1,290	40.0	bu. m., s....	Rare.
18829	U.S.N.M.	1	D2093....	39 42 50 N.; 71 01 20 W..	1,000	39.0	for., s.......	Rare.
18830	U.S.N.M.	2	D2117....	15 24 20 N.; 63 31 30 W..	683	39.8	yl. m., fne. s.	Rare.
18831	U.S.N.M.	8	D2144....	9 49 00 N.; 79 31 30 W..	896	....	gn. m........	Common.
18832	U.S.N.M.	7	D2150....	13 34 45 N.; 81 21 10 W..	382	45.8	wh. crs. s....	Frequent.
18833	U.S.N.M.	10+	D2202....	39 38 00 N.; 71 39 45 W..	515	39.1	gn. m........	Abundant.
18834	U.S.N.M.	1	D2205....	39 35 00 N.; 71 18 45 W..	1,073	38.1	gy. oz........	Rare.
18835	U.S.N.M.	10+	D2212....	39 59 30 N.; 70 30 45 W..	428	40.0	gn. m........	Abundant.
18836	U.S.N.M.	8	D2262....	39 54 45 N.; 69 29 45 W..	250	41.6	gn. m., s....	Common.
18837	U.S.N.M.	2	D2352....	22 35 00 N.; 84 23 00 W..	463	45.0	wh. co.......	Rare.
18838	U.S.N.M.	1	D2385....	28 51 00 N.; 88 18 00 W..	730	40.1	gy. m........	Rare.
18839	U.S.N.M.	3	D2392....	28 47 30 N.; 87 27 00 W..	724	40.7	br. gy. m....	Few.
18840	U.S.N.M.	2	D2393....	28 43 00 N.; 87 14 30 W..	525	41.1	lt. gy. m....	Rare.
18841	U.S.N.M.	6	D2394....	28 38 30 N.; 87 02 00 W..	420	41.8	gn. m........	Frequent.
18842	U.S.N.M.	10+	D2395....	28 36 15 N.; 86 50 00 W..	347	44.1	gy. m........	Abundant.
18843	U.S.N.M.	8	D2396....	28 34 00 N.; 86 48 00 W..	335	....	gy. m........	Common.
18844	U.S.N.M.	1	D2398....	28 45 00 N.; 86 26 00 W..	227	48.6	gy. m........	Rare.
18845	U.S.N.M.	5	D2399....	28 44 00 N.; 86 18 00 W..	196	51.6	gy. m........	Few.
18846	U.S.N.M.	4	D2400....	28 41 00 N.; 86 07 00 W..	169	....	gy. m........	Few.
18847	U.S.N.M.	3	D2544....	40 01 45 N.; 70 24 00 W..	131	47.7	gn. s., bk. sp.	Few.
18848	U.S.N.M.	3	D2552....	39 47 07 N.; 70 35 00 W..	721	39.6	gy. oz........	Few.
18849	U.S.N.M.	5	D2581....	39 43 00 N.; 71 34 00 W..	394	....	gn. m........	Few.
18850	U.S.N.M.	1	D2677....	32 39 00 N.; 76 50 30 W..	478	39.3	gn. m........	Rare.

Cristellaria peregrina—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″				
18851	U.S.N.M.	2	D2689....	39 42 00 N.; 71 15 30 W..	525	....	gn. m.......	Rare.
18852	U.S.N.M.	2	D2751....	16 54 00 N.; 63 12 00 W..	687	40.0	bu. glob. oz .	Rare.
18853	U.S.N.M.	4	D2763....	24 17 00 S.; 68 11 00 W..	671	37.9	br. glob. oz..	Few.
18854	U.S.N.M.	1	....	Off Fowey Light, Fla....	100	....	....	Rare.

CRISTELLARIA CASSIS Fichtel and Moll?

H. B. Brady, Parker, and Jones (Trans. Zool. Soc. London, vol. 12, 1888, p. 224, pl. 44, fig. 16) figure a broken specimen which they refer to this species. It was from the Abrohlos Bank, 40 fathoms (73 meters), and shows a flattened test with the sutures ornamented by fine knobs. I have failed to find specimens of this character in the Atlantic material I have examined.

CRISTELLARIA CALCAR (Linnaeus).

Plate 30, fig. 7; pl. 31, figs. 4, 5,

"Nautilus minimus non umbilicatus" Gaultieri, Index Test., 1742, pl. 19, fig. C.

"Nautili (Lenticulae radiatae)" Soldani, Testaceographia, vol. 1, pt. 1, 1789, p. 54, pl. 33, figs. *aa*, *bb*.

Nautilus calcar Linnaeus, Syst. Nat., ed. 12, 1767, p. 1162, No. 272; (Gmelin's ed. 13, 1788, p. 3770, No. 2.

Cristellaria calcar H. B. Brady (part), Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 55, pl. 70, figs. 9–12 (not figs. 13–15).—H. B. Brady, Parker, and Jones, Trans. Zool. Soc. London, vol. 12, 1888, p. 224, pl. 44, fig. 14.—Flint, Rep. U. S. Nat. Mus., 1897 (1899), p. 318, pl. 66, fig. 1 (part).—Cushman, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 72, pl. 32, fig. 4.

Description.—Test close-coiled, biconvex, umbonate; chambers comparatively few, usually only 5 or 6 in the last-formed coil, the earlier ones often seen through the transparent umbilical region; sutures distinct but not depressed, nearly straight; wall smooth, periphery with a narrow carina, with a typically long acicular spine, one from each chamber; aperture at the angle of the chamber, radiate, slightly projecting.

Diameter without spines about 1 millimeter.

Distribution.—From a study of the various figures referred to this species it will at once become evident that there are numerous forms, varieties, and species included under this name. As it is somewhat difficult to determine exactly what should be the type of the Linnaean species, I have referred to it here specimens fitting the above description, and similar to some of those figured by Brady and Flint. The Atlantic material which fits this restricted requirement is almost without exception from the warmer portions of the Western Atlantic, south of Cape Hatteras, along the Florida coast, and the Gulf of Mexico and the Caribbean. This also includes the range of the stations from which Flint records the species. Brady records it from off the West Indies and from the northwestern coast of Africa. Such specimens are common in warm waters of the Pacific also. None of the English workers on the foraminifera seem to have recorded it from off the British Isles. In view of the very considerable work done on this area, this lack of record is significant.

Some of the specimens have very reduced spines, similar to the form that I have described as var. *aspinosa* Cushman from the Miocene of the Bowden Marl, Bowden, Jamaica.[63]

Cristellaria calcar—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
18855	U.S.N.M.	1	D2117....	15 24 20 N.; 63 31 30 W..	683	39.8	yl. m., fne. s.	Rare.
18856	U.S.N.M.	1	D2150....	13 34 45 N.; 81 21 10 W..	382	45.8	wh. crs. s....	Rare.
18857	U.S.N.M.	1	D2311....	32 55 00 N.; 77 54 00 W..	79	59.1	crs. s., bk. sp.	Rare.
18858	U.S.N.M.	5	D2312....	32 54 00 N.; 77 53 30 W..	88	57.8	crs. s., bk. sp.	Few.
18859	U.S.N.M.	1	D2313....	32 53 00 N.; 77 53 00 W..	99	57.2	crs. s., bk. sp.	Rare.
18860	U.S.N.M.	1	D2318....	24 25 45 N.; 81 46 00 W..	45	75.0	co...........	Rare.
18861	U.S.N.M.	1	D2335....	23 10 39 N.; 82 20 21 W..	204	....	....	Rare.
18862	U.S.N.M.	1	D2339....	23 10 40 N.; 82 20 15 W..	191	....	co...........	Rare.
18863	U.S.N.M.	1	D2355....	20 56 48 N.; 86 27 00 W..	399	....	yl. oz.......	Rare.
18864	U.S.N.M.	10+	D2377....	29 07 30 N.; 88 08 00 W..	210	67.0	gy. m.......	Abundant.
18865	U.S.N.M.	3	D2378....	29 14 30 N.; 88 09 30 W..	68	....	gy. m.......	Few.
18866	U.S.N.M.	1	D2395....	28 36 15 N.; 86 50 00 W..	347	44.1	gy. m.......	Rare.
18867	U.S.N.M.	1	D2396....	28 34 00 N.; 86 48 00 W..	335	....	gy. m.......	Rare.
18868	U.S.N.M.	2	D2398....	28 45 00 N.; 86 26 00 W..	227	48.6	gy. m.......	Rare.
18869	U.S.N.M.	7	D2399....	28 44 00 N.; 86 18 00 W..	196	51.6	gy. m.......	Frequent.
18870	U.S.N.M.	4	D2400....	28 41 00 N.; 86 07 00 W..	169	....	gy. m.......	Few.
18871	U.S.N.M.	2	D2552....	39 47 07 N.; 70 35 00 W..	721	39.6	gy. oz.......	Rare.
18872	U.S.N.M.	2	D2614....	34 09 00 N.; 76 02 00 W..	168	....	gy. s., bk. sp.	Rare.
18873	U.S.N.M.	1	D2641....	25 11 30 N.; 80 10 00 W..	60	69.2	co. s........	Rare.
18874	U.S.N.M.	1	D2644....	25 40 00 N.; 80 00 00 W..	193	43.4	gy. s........	Rare.
18875	U.S.N.M.	5	D2648....	25 53 00 N., 80 03 30 W..	84	....	gn. m.......	Few.
18876	U.S.N.M.	2	....	Off Sand Key, Fla.......	72	....	....	Rare.

CRISTELLARIA ANTILLEA, new species.

Plate 31, fig. 1; pl. 32, fig. 1; pl. 33, fig. 1; pl. 34, fig. 1.

Nodosarina crepidula (FICHTEL and MOLL), var. *cassis* Goës (not Fichtel and Moll), Kongl. Svensk. Vet. Akad. Handl., vol. 19. no. 4, 1882, p. 49, pl. 3, figs. 50, 51.

Cristellaria echinata FLINT (not D'Orbigny), Rep. U. S. Nat. Mus., 1897 (1899), p. 318, pl. 66, fig. 2.

Description.—Test much compressed, periphery with large acicular spines, carinate between, the last two or three chambers uncoiled, remaining ones close-coiled; chambers distinct, somewhat inflated;

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[63] Publ. 291, Carnegie Inst., Washington, 1919, p. 37, pl. 6, fig. 8.

sutures distinct, those of the early coiled portion with beads along the sutures, decreasing in the later portion where they are often depressed and unornamented; wall between the sutures often beaded, sometimes with longitudinal rows; aperture in the coiled portion near the periphery, in specimens becoming uncoiled in the middle of the end of the chamber, broad, radiate.

Diameter up to 4 mm.

Distribution.—Type-specimen (U.S.N.M. Cat. No. 18803) from *Albatross* station D2377, in 210 fathoms (384 meters), in the northern part of the Gulf of Mexico. This species was originally figured by Goës in his paper on the Caribbean foraminifera, and later by Flint from the Gulf of Mexico, 169–210 fathoms (309–384 meters). I have had specimens from three stations, one identical with one of those of Flint, in the northern part of the Gulf of Mexico, one off the coast of Georgia, and one off the Carolinas.

This is a large beautiful species with its spinose margin and peculiar ornamentation. The figure of Goës shows a senescent form in which the last-formed chamber is much reduced in size and the aperture broken. The species is apparently limited to the western Atlantic in tropical and subtropical waters.

Cristellaria antillea—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°*F.*		
18802	U.S.N.M.	1	D2314....	32 43 00 N.; 77 51 00 W..	159	47.4	crs. s., bk. sp.	Rare.
18803	U.S.N.M.	1	D2377....	29 07 30 N.; 88 08 00 W..	210	67.0	gy. m.......	Rare.
18804	U.S.N.M.	5						
18805	U.S.N.M.	1	D2425....	36 20 24 N.; 76 46 30 W..	119	51.5	dk. gy. m., fne. s.	Rare.

CRISTELLARIA CREPIDULA (Fichtel and Moll).

Plate 35, figs. 3, 4.

Nautilus crepidula Fichtel and Moll, Test. Micr., 1803, p. 107, pl. 19, figs. *g–i*.

Cristellaria crepidula D'Orbigny, in De la Sagra, Hist Fis. Pol. Nat. Cuba, "Foraminifères," 1839, p. 64, pl. 8, figs. 17, 18.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 542, pl. 67, figs. 17, 19, 20.—Goës, Bull. Mus. Comp. Zoöl., vol. 29, 1896, p. 57.—Flint, Rep. U. S. Nat. Mus., 1897 (1899), p. 316, pl. 63, fig. 2.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 70, pl. 29, fig. 5, 6, [?]; pl. 31, figs. 2–5.—Heron-Allen and Earland, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 57.

Description.—Test elongate, somewhat compressed, the early chambers coiled, the later ones somewhat uncoiled; chambers comparatively few, slightly inflated; sutures distinct, usually slightly depressed; wall smooth; aperture terminal, radiate.

Length up to 1.50 mm.

Distribution.—Various forms of uncoiled compressed Cristellarias are included under this name by various authors. Specimens have occurred at a considerable number of stations in the Western Atlantic, in the Gulf of Mexico, and off the southeastern coast of the United States. There are numerous records for the species elsewhere, off the Abrohlos Bank, Brazil, numerous records from off the British Isles, also in the northern regions about the coast of Greenland, and in other parts of the world from most of the regions where foraminifera have been recorded. From a study of specimens from various regions it seems to me that it should be possible to distinguish different forms which have a definite geographical distribution.

Cristellaria crepidula—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
18972	U.S.N.M.	1	D2247....	40 03 00 N.; 69 57 00 W..	67	52.4	gn. m., bk. s.	Rare.
18973	U.S.N.M.	1	D2358....	20 19 00 N.; 87 03 30 W..	222	....	fne. wh. co..	Rare.
18974	U.S.N.M.	2	D2399....	28 44 00 N.; 86 18 00 W..	196	51.6	gy. m.......	Rare.
18975	U.S.N.M.	2	D2400....	28 41 00 N.; 86 07 00 W..	169	....	gy. m.......	Rare.
18976	U.S.N.M.	1	D2614....	34 09 00 N.; 76 02 00 W..	168	....	gy. s., bk. sp	Rare.
18977	U.S.N.M.	1	D2639....	25 04 50 N.; 80 15 10 W..	56	....	co. s.........	Rare.
18978	U.S.N.M.	5	D2641....	25 11 30 N.; 80 10 00 W..	60	69.2	co. s.........	Frequent.
18979	U.S.N.M.	1	D2648....	25 53 00 N.; 80 03 30 W..	84	....	gn. m.......	Rare.
18980	U.S.N.M.	1	D2756....	3 22 00 S.; 37 49 00 W..	417	40.5	gy. s., bk. sp	Rare.

CRISTELLARIA HAUERINA D'Orbigny.

The only record for this species seems to be that of Heron-Allen and Earland,[64] who record "a single typical specimen off South Cornwall."

CRISTELLARIA SCHLOENBACHI Reuss?

Plate 35. figs. 8–10.

Cristellaria schloenbachi Reuss, Sitz. Akad. Wiss. Wien, vol. 46, 1862, (1863), p. 65, pl. 6, figs. 14, 15.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 539, pl. 67, fig. 7.—Flint, Rep. U. S. Nat. Mus., 1897 (1899), p. 315, pl. 63, fig. 4.—Chapman, The Foraminifera, 1902, p. 403.—Millett, Journ. Roy. Micr. Soc., 1902, p. 253.—Chapman, Trans. N. Zealand Inst., vol. 38, 1905, p. 96; Subantarctic Ids. N. Zealand, 1909, p. 342.—Pearcey, Trans. Roy. Soc. Edinb., vol. 49, 1914, p. 1022.—Chapman, Biol. Res. *Endeavour*, vol. 3, pt. 1, 1915, p. 24.—Cushman, Proc. U. S. Nat. Mus., vol. 56, 1919, p. 616; Bull. 100, U. S. Nat. Mus., vol. 4, 1921, p. 249.

Description.—Test elongate, several times as long as broad, very early portion close-coiled, very quickly becoming uncoiled, elliptical in transverse section, periphery rounded, about 12 visible chambers, increasing rapidly in size as added, early ones more compressed, later ones more inflated; sutures distinct, oblique, slightly depressed; wall smooth, thin; aperture terminal, at the periphery, radiate.

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[64] Journ. Roy. Micr. Soc., 1916, p. 47.

Length up to 2 mm.

Distribution.—Brady's Atlantic specimens were from off Bermuda, 435 fathoms (796 meters), and from off Culebra Island, 390 fathoms (713 meters). He also records it from off Raine Island, Torres Strait, 155 fathoms (283 meters). Flint had specimens from the northern part of the Gulf of Mexico, in 169 and 210 fathoms (309 and 384 meters). I have had specimens from the same region and also from the Caribbean. It seems very doubtful if this recent species which according to the records seems to be limited to the tropical western Atlantic and tropical Indo-Pacific is really the same as that described by Reüss from the upper Cretaceous of Northern Germany. I have had very few Atlantic specimens, however, and for the present have preferred to use the name which Brady used for this species. There are numerous records from the region of Australia and New Zealand and it is probably widely spread in the Indo-Pacific. Similar specimens have occured in the Philippine region, but usually not in considerable numbers.

Cristellaria schoenbachi?—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
18908	U.S.N.M.	2	D2150....	13 34 45 N.; 81 21 10 W..	382	45.8	wh. crs. s....	Rare.
18909	U.S.N.M.	3	D2399....	28 44 00 N.; 86 18 00 W..	196	51.6	gy. m.......	Few.
18910	U.S.N.M.	1	D2400....	28 41 00 N.; 86 07 00 W..	169	....	gy. m.......	Rare.
18911	U.S.N.M.	1	D2713....	38 20 00 N.; 70 08 30 W..	1,859	....	br. oz........	Rare.

CRISTELLARIA OBTUSATA Reuss, var. SUBALATA H. B. Brady.

Plate 30, fig. 5; pl. 31, figs. 2, 3.

Cristellaria obtusata Reuss, var. *subalata* H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 536, pl. 66, figs. 24, 25.—Flint, Rep. U. S. Nat. Mus., 1897 (1899), p. 315, pl. 61, fig. 3.

Description.—Test much elongate, the first few chambers close-coiled, the later ones becoming uncoiled, basal portion of the test with a transparent somewhat triangular projecting keel, which overlaps the sides of the coiled portion of the test; chambers distinct, those of the later portion slightly inflated; sutures distinct, somewhat limbate, of clear shell material, nearly transparent; wall smooth; aperture in the later portion terminal, radiate.

Length up to 6 mm.

Distribution.—Brady described this variety from the northern Atlantic at depths ranging from 130–630 fathoms (238–1,152 meters). The only one definitely placed, so far as I have been able to ascertain, is off the West Indies. Flint had this same form from the Gulf of Mexico, off Santa Lucia in the West Indies and perhaps off Cape Fear. Wright[65] records it from 1,000–1,020 fathoms (1,829–1,866 meters), off the southwest of Ireland. The only other record seems to be that of Chapman, who records it as rare from the Arabian Sea.[66] I have had it from four *Albatross* stations, three of them in the Caribbean, in the general region of Brady's and Flint's records, and the fourth from off the southeastern coast of the United States, where Flint records it.

This form differs from *Cristellaria albatrossi* in the clear limbate sutures and in the wing developed at the base of the test which is clear, fairly thick, and yet shows no lines of growth.

I doubt very much the relationship of this form to *Cristellaria obtusata* Reuss. As there is already a *Cristellaria subalata*, raising this form to specific rank would involve a new name.

Cristellaria obtusata, var. subalata—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
18904	U.S.N.M.	1	D2133....	17 44 05 N.; 75 39 00 W..	23	....	co., brk. sh..	Rare.
18905	U.S.N.M.	2	D2678....	32 40 00 N.; 76 40 30 W..	731	38.7	lt. gy. oz....	Rare.
18906	U.S.N.M.	5	D2751....	16 54 00 N.; 63 12 00 W..	687	40.0	bu. glob. oz..	Few.
18907	U.S.N.M.	1	H79......	14 20 30 N.; 63 10 00 W..	821	....	co. s., sh.....	Rare.

CRISTELLARIA ALBATROSSI, new species.

Plate 19, figs. 4, 5.

Cristellaria compressa Flint (part) (not D'Orbigny), Rep. U. S. Nat. Mus., 1897 (1899), p. 315, pl. 62, fig. 1 (right-hand specimen).

Description.—Test composed of two portions, the earlier close-coiled, the later consisting of an uncoiled portion of several chambers, the early portion of the test with a thin broad keel, showing very clearly the lines of growth; chambers fairly distinct but not inflated except in the latest portion of the uncoiled part; sutures indistinct, in the early portion, or at least not raised above or depressed below the general surface, those of the later portion somewhat depressed; wall smooth; aperture radiate.

Length up to 5 mm.

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[65] Ann. Mag. Nat. Hist., ser. 6, vol. 4, 1889, p. 449; Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 485.

[66] Proc. Zool. Soc. London, 1895, p. 33.

Distribution.—Type-specimen (U.S.N.M. Cat. No. 18881) from *Albatross* station D2203, in 705 fathoms (1,289 meters), off the northeastern coast of the United States. This species is abundant at numerous stations off the northeastern coast of the United States. It is evidently the same as that figured by Parker and Jones[67] as *Marginulina lituus* from the Arctic in 160 fathoms (293 meters), at Nordland, Norway. Flint's specimens were from this same general region, and it is evidently a species which ranges south, perhaps to the latitude of Cape Hatteras, and in its northern distribution reaches to the Arctic Circle.

Cristellaria albatrossi—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
3114	U.S.N.M.	1	D2037....	38 53 00 N.; 69 23 30 W..	1,731	38.0	glob. oz......	Rare.
18877	U.S.N.M.	4	D2038....	38 30 30 N.; 69 08 25 W..	2,033	....	glob. oz......	Few.
18878	U.S.N.M.	1	D2039....	38 19 26 N.; 68 20 20 W..	2,369	....	glob. oz......	Rare.
18879	U.S.N.M.	2	D2041....	39 22 50 N.; 68 25 00 W..	1,608	38.0	glob. oz......	Rare.
18880	U.S.N.M.	2	D2172....	38 01 15 N.; 73 44 00 W..	568	39.0	gn. m.......	Rare.
18881	U.S.N.M.	1	D2203....	39 34 15 N.; 71 41 15 W..	705	38.9	gn. m., s....	Common.
18882	U.S.N.M.	9						
18883	U.S.N.M.	2	D2208....	39 33 00 N.; 71 16 15 W..	1,178	38.4	gn. m.......	Rare.
18884	U.S.N.M.	1	D2219....	39 36 22 N.; 69 29 00 W..	948	38.8	gy. m.......	Rare.
18885	U.S.N.M.	5	D2234....	39 09 00 N.; 72 03 15 W..	810	38.6	gn. m.......	Few.
18886	U.S.N.M.	1	D2335....	23 10 39 N.; 82 20 21 W..	204	....	....	Rare.
18887	U.S.N.M.	1	D2530....	40 53 30 N.; 66 24 00 W..	956	38.4	gy. oz.......	Rare.
3091	U.S.N.M.	1						
18888	U.S.N.M.	1	D2552....	39 47 07 N.; 70 35 00 W..	721	39.6	gy. oz.......	Rare.
18889	U.S.N.M.	2	D2562....	39 15 30 N.; 71 25 00 W..	1,434	37.3	gy. oz.......	Rare.
18890	U.S.N.M.	7	D2682....	39 38 00 N.; 70 22 00 W..	990	....	gn. m.......	Frequent.
18891	U.S.N.M.	10+	D2689....	39 42 00 N.; 71 15 30 W..	525	....	gn. m.......	Abundant.
18892	U.S.N.M.	4	D2710....	40 06 00 N.; 68 01 00 W..	984	....	gn. m.......	Few.
18893	U.S.N.M.	8	D2711....	38 59 00 N.; 70 07 00 W..	1,544	....	glob. oz......	Frequent.

CRISTELLARIA ALBATROSSI, new species, variety.

There is a variety of this species in which the keel is usually much less developed and the test more rounded. This occurs at many of the stations with the typical form, as the following table shows.

Cristellaria albatrossi, var.—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
18894	U.S.N.M.	3	D2035....	39 26 16 N.; 70 02 37 W..	1,362	....	glob. oz.....	Few.
18895	U.S.N.M.	7	D2038....	38 30 30 N.; 69 08 25 W..	2,033	....	glob. oz.....	Frequent.
18896	U.S.N.M.	8	D2039....	38 19 26 N.; 68 20 20 W..	2,369	....	glob. oz.....	Frequent.
18897	U.S.N.M.	10+	D2042....	39 33 00 N.; 68 26 45 W..	1,555	38.5	glob. oz.....	Abundant.
18898	U.S.N.M.	5	D2043....	39 49 00 N.; 68 28 30 W..	1,467	38.5	glob. oz.....	Few.
18899	U.S.N.M.	2	D2072....	41 53 00 N.; 66 35 00 W..	858	39.0	gy. m.......	Rare.
18900	U.S.N.M.	1	D2105....	37 50 00 N.; 73 08 50 W..	1,395	41.0	glob. oz.....	Rare.
18901	U.S.N.M.	6	D2174....	38 15 00 N.; 72 03 00 W..	1,594	....	gy. m.......	Frequent.
18902	U.S.N.M.	5	D2221....	39 05 30 N.; 70 44 30 W..	1,525	36.9	gy. oz.......	Few.
18903	U.S.N.M.	1	D2385....	28 51 00 N.; 88 18 00 W..	730	40.1	gy. m.......	Rare.

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[67] Philos. Trans., 1865, p. 348, pl. 18, figs. 14*a*, *b*.

CRISTELLARIA MARGINULINOIDES Goës.

Plate 19, fig. 3.

Cristellaria aculeata D'ORBIGNY, var. *marginulinoides* GOËS, Bull. Mus. Comp. Zoöl., vol. 29, 1896, p. 56, pl. 5, figs. 15, 16.

Description.—Test elongate, much compressed, the early portion close coiled, the later chambers uncoiled and becoming more inflated, periphery slightly keeled in the early portion, with or without spines; sutures marked by a series of fine beadlike processes, slightly elongate across the sutures; sutures in the later portion depressed, somewhat limbate, not beaded, general surface between the sutures of the early portion somewhat spinose, later smooth, apertural face rounded, not truncate; aperture becoming terminal, slightly projecting, small, radiate.

Length of *Albatross* specimens slightly exceeding 1 mm.; as given by Goës, up to 2.50 mm.

Distribution.—I have had specimens from two *Albatross* stations, one in the northern part of the Gulf of Mexico, the other off the coast of Georgia. These differ somewhat from Goës's originals in having very little trace of the spines on the margin, but they have the characteristic sutural ornamentation and the rounded later portion of the test, in these characters differing from *Cristellaria subaculeata*, var. *glabrata*. Goës's specimens were from the Caribbean in 200 fathoms (366 meters).

Cristellaria marginulinoides—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
18912	U.S.N.M.	2	D2313....	32 53 00 N.; 77 53 00 W..	99	57.2	crs.s., bk.sp.	Rare.
18913	U.S.N.M.	2	D2378....	29 14 30 N.; 88 09 30 W..	68	....	gy. m.......	Rare.

CRISTELLARIA LIMBATA Flint.

Plate 32, figs. 2, 3.

Cristellaria limbata FLINT, Rep. U. S. Nat. Mus., 1897 (1899), p. 318, pl. 67, fig. 1.

Description.—Test elongate, early chambers close-coiled, later ones forming a linear series, dorsal side subacute, ventral side broadly rounded; chambers comparatively few, distinct; sutures limbate, with a thick band of raised clear shell material, periphery of the early portion with a few short rounded acicular spines, upper portion smooth; aperture projecting, at the dorsal side of the last-formed chamber.

Length up to 2 mm.

Distribution.—The type specimens of this species described by Flint were from *Albatross* stations in the northern part of the Gulf of Mexico in 196 and 210 fathoms (359 and 384 meters). I have had material from this same region and from two other stations, one off the southern tip of Florida, the other off the coast of Georgia. This is a common range for numerous species.

In some ways the species resembles the young of *Vaginulina spinigera*, but the specimens are always small and more *Cristellaria*-like in every way.

Cristellaria limbata—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
18808	U.S.N.M.	7	D2314....	32 43 00 N.; 77 51 00 W..	159	47.4	crs.s., bk.sp.	Frequent.
18809	U.S.N.M.	6	D2399....	28 44 00 N.; 86 18 00 W..	196	51.6	gy. m.......	Frequent.
18810	U.S.N.M.	1	D2400....	28 41 00 N.; 86 07 00 W..	169	....	gy. m.......	Rare.
18811	U.S.N.M.	1	D2648....	25 53 00 N.; 80 03 30 W..	84	....	gn. m.......	Rare.

CRISTELLARIA SUBACULEATA, new species.

Plate 34, fig. 2.

Cristellaria aculeata H. B. Brady (not D'Orbigny), Rep. Voy. *Challenger*, vol. 9, 1884, p. 555, pl. 71, figs. 4, 5.

Description.—Test slightly longer than broad, somewhat compressed, periphery with a narrow thin keel, test becoming slightly uncoiled in the later portion; chambers comparatively few, about 8 in the last-formed coil, distinct, but not inflated; sutures marked by lines of raised bead-like prominences, the surface of the test between with finer more spinose projections, apertural face truncate, smooth, the sides with a raised keel; aperture projecting, rather broad, radiate, at the peripheral angle of the last-formed chamber.

Length up to 1.6 mm.

Distribution.—Type-specimen (U.S.N.M. Cat. No. 18914) from *Albatross* station D2377, in 210 fathoms (384 meters), in the northern part of the Gulf of Mexico. Brady gives two records for this species—off Culebra Island, 390 fathoms (713 meters), and off Sombrero Island, 450 fathoms (823 meters). The only specimen I have had which is identical with Brady's is from the type station. This has the typical surface ornamentation as figured by Brady and seems distinct from the following variety. The species seems to be limited to the tropical western Atlantic. However, Earland[68] records one small and immature specimen and one large shell from Bognor, Sussex, England.

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[68] Journ. Quekett Micr. Club, ser. 2, vol. 9, 1905, p. 216.

Cristellaria subaculeata—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
18914	U.S.N.M.	1	D2377....	29 07 30 N.; 88 08 00 W..	210	67.0	gy. m......	Rare.

CRISTELLARIA SUBACULEATA, new species, var. GLABRATA, new variety.

Plate 32, fig. 4; pl. 33, figs. 2, 3; pl. 34, fig. 3.

Cristellaria aculeata Flint (not D'Orbigny), Rep. U. S. Nat. Mus., 1897 (1899), p. 318, pl. 66, fig. 3.

Description.—Variety differing from the typical in the larger proportion of the uncoiled part and especially the greater development of spines on the periphery and the lack of the secondary ornamentation between the sutural lines, the wall there being smooth.

Distribution.—Type-specimen (U.S.N.M. Cat. No. 18915) from *Albatross* station D2377, in 210 fathoms (384 meters), in the northern part of the Gulf of Mexico. At the type station this species occurs abundantly, and specimens were also obtained from two other stations in the northern part of the Gulf of Mexico, closely adjacent to the type station. Flint's specimens referred to *Cristellaria aculeata* are the same as this, coming from two of the stations which are recorded here.

Cristellaria subaculeata, var. glabrata—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
18915	U.S.N.M.	1	D2377....	29 07 30 N.; 88 08 00 W..	210	67.0	gy. m.......	Abundant.
18916	U.S.N.M.	10						
18917	U.S.N.M.	7	D2399....	28 44 00 N.; 86 18 00 W..	196	51.6	gy. m.......	Frequent
18918	U.S.N.M.	3	D2400....	28 41 00 N.; 86 07 00 W..	169	....	gy. m.......	Few.

CRISTELLARIA ACUTAURICULARIS Fichtel and Moll.

Plate 35, fig. 1.

Specimens have been recorded under this name from a few Atlantic stations. Flint records and figures specimens from off the coasts of Florida and South Carolina, 60–90 fathoms (110–165 meters). Pearcey records it from 56 fathoms (102 meters), Burdwood Bank. The other Atlantic records are those given by Heron-Allen and Earland,[69] who record it from off Clare Island, and[70] "few, not typical," west of Scotland.

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[69] Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 99, pl. 8, fig. 15.

[70] Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 262.

CRISTELLARIA ITALICA (Defrance).

Plate 35, figs. 2, 5-7.

Saracenaria italica DEFRANCE, Dict. Sci. Nat., vol. 32, 1824, p. 177; vol. 47, 1827, p. 344; Atlas Conch., pl. 13, fig. 6.—BLAINVILLE, Man. de Mal., 1825, p. 370, pl. 5, fig. 6.

Cristellaria (*Saracenaria*) *italica* D'ORBIGNY, Ann. Sci. Nat., vol. 7. 1826, p. 293, No. 26; Modèles, Nos. 19 and 25.

Cristellaria italica PARKER, JONES, and H. B. BRADY, Ann. Mag. Nat. Hist., ser. 3, vol. 16, 1865, pp. 21, 32, pl. 1, figs. 41, 42.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 544, pl. 68, figs. 17, 18, 20-23; Journ. Roy. Micr. Soc., 1887, p. 912.—WRIGHT, Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 485.—EGGER, Abh. kön. bay. Akad. Wis. München, Cl. II, vol. 18, 1893, p. 350, pl. 12, figs. 22, 23, 26, 40-42.—FORNASINI, Mem. Accad. Sci. Ist. Bologna, ser. 5, vol. 4, 1894, p. 219, pl. 3, fig. 8; vol. 5, 1895, p. 12, pl. 4, fig. 28.—GOËS, Bull. Mus. Comp. Zoöl., vol. 29, 1896, p. 58.—FLINT, Rep. U. S. Nat. Mus., 1897 (1899), p. 316, pl. 63, fig. 6.—MILLETT, Journ. Roy. Micr. Soc., 1902, p. 256.—CHAPMAN, Trans. N. Zealand Inst., vol. 38, 1905, p. 96.—HERON-ALLEN and EARLAND, Journ. Roy. Micr. Soc., 1907, p. 428.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 78, pl. 33, fig. 3.—HERON-ALLEN and EARLAND, Journ. Roy. Micr. Soc., 1916, p. 47.—CUSHMAN, Bull. 103, U. S. Nat. Mus., 1918, p. 61; Publ. 291, Carnegie Inst. Washington, 1919, p. 38; Proc. U. S. Nat. Mus., vol. 56, 1919, p. 617; Bull. 100, U. S. Nat. Mus., vol. 4, 1921, p. 252, pl. 51, fig. 2.

Description.—Test stout, trihedral, triangular in cross section, early chambers close-coiled, later ones uncoiling but short, not extending back to the earlier volutions; sutures somewhat depressed; wall smooth; face of the last-formed chamber nearly triangular.

Length of *Albatross* Atlantic specimens 3.50 mm.

Distribution.—The Atlantic records for this species are given by Brady off Sombrero and Culebra Islands, West Indies, off Bermuda, and off the coast of Spain. It is recorded by Goës from the Caribbean and the Gulf of Mexico, 169-658 fathoms (308-1,203 meters). He records specimens attaining the length of 8 mm. Flint had specimens from the Gulf of Mexico and off the coast of Georgia, 196 and 440 fathoms (359 and 805 meters). I have had specimens from four *Albatross* stations, two stations in the Gulf of Mexico, one of which is the same as that from which Flint records the species, one off the northern coast of Cuba, and one off the South Carolina coast. From the British Isles it is recorded from the Estuary of the Dee, a single specimen off the southwest of Ireland, at 345 fathoms (631 meters) (Wright); and off South Cornwall (Heron-Allen and Earland). It occurs in the Miocene of the Bowden marl of Jamaica as fairly large specimens, and is known from numerous records in the Indo-Pacific, often reaching a large size at moderate depths in tropical waters.

Cristellaria italica—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
18967	U.S.N.M.	2	D2150....	13 34 45 N.; 81 21 10 W..	382	45.8	wh. crs. s...	Rare.
18968	U.S.N.M.	2	D2378....	29 14 30 N.; 88 09 30 W..	68	....	gy. m.......	Rare.
18966	U.S.N.M.	4	D2399....	28 44 00 N.; 86 18 00 W..	196	51.6	gy. m.......	Few.
18969	U.S.N.M.	1	D2614....	34 09 00 N.; 76 02 00 W..	168	....	gy. s., bk. sp.	Rare.

CRISTELLARIA LATIFRONS H. B. Brady.

Cristellaria latifrons H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 544, pl. 68, fig. 19; pl. 113, figs, 11*a*, *b*.—Flint, Rep. U. S. Nat. Mus., 1897 (1899), p. 316, pl. 63, fig. 3.—Chapman, Trans. N. Zealand Inst., vol. 38, 1905, p. 97.—Mestayer, Trans. N. Zealand Inst., vol. 48, 1916, p. 129.—Sidebottom (?), Journ. Roy. Micr. Soc., 1918, p. 140.—Cushman, Proc. U. S. Nat. Mus., vol. 56, 1919, p. 617; Bull. 100, U. S. Nat. Mus., vol. 4, 1921, p. 254.

Description.—Test elongate, generally triangular in transverse section; chambers comparatively few, periphery carinate; sutures distinct, curved, very slightly if at all depressed; apertural face of the last-formed chamber truncate, reaching from the apertural end of the test nearly to the initial end; wall smooth; aperture radiate, terminal.

Length up to 1.50 mm.

Distribution.—Brady described this species from two *Challenger* stations, one off the western coast of New Zealand, 275 fathoms (503 meters), and the other in the Atlantic, off Culebra Island, West Indies, 390 fathoms (713 meters). Apparently the only other Atlantic records are those given by Flint, off Careysfort Light, off Southern Florida, in 60 fathoms (110 meters), and *Albatross* station D2377, in the northern part of the Gulf of Mexico, in 210 fathoms (384 meters). The other records are from the Indo-Pacific, especially the area of Australia and New Zealand, with a few records which I have given from the Philippines. I have had Atlantic specimens from three stations, one in the northern part of the Gulf of Mexico and two off the eastern coast of the United States. In the Summary of Results of the *Challenger* Expedition the species is recorded off Bermuda. Therefore there are either two or more species, one in the western Atlantic, the other in the Indo-Pacific, or else a single widely spread species covering these two regions.

Cristellaria latifrons—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°*F.*		
18935	U.S.N.M.	1	D2399......	28 44 00 N.; 86 18 00 W..	196	51.6	gy.m.......	Rare.
18936	U.S.N.M.	1	D2544......	40 01 45 N.; 70 24 00 W..	131	47.7	gn.s., bk.sp.	Rare.
18937	U.S.N.M.	1	*Fish Hawk* 1038.	....	......	......	....	

Genus MARGINULINA D'Orbigny, 1826.

Marginulina D'ORBIGNY (type, *M. glabra* D'Orbigny), Ann. Sci. Nat., vol. 7, 1826, p. 258.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 526.—CHAPMAN, The Foraminifera, 1902, p. 191.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 79.

Description.—Test subcylindrical, early portion close-coiled, later chambers uncoiled, rounded in transverse section, the last-formed chambers often inflated; aperture in early chambers marginal, later often becoming nearly median, usually radiate.

It is a question whether the species placed under this genus might not be included under the uncoiled Cristellarias. In general the chambers of the uncoiled portion in *Marginulina* are nearly circular in transverse section and the ornamentation is usually limited to longitudinal costae.

Its geological history goes back, as does that of *Cristellaria* and *Nodosaria*, to the Cambrian.

MARGINULINA GLABRA D'Orbigny.

Plate 36, figs. 5, 6.

Marginulina glabra D'ORBIGNY, Ann. Sci. Nat., vol. 7, 1826, p. 259, No. 6; Modéles, No. 55.—PARKER, JONES, and H. B. BRADY, Ann. Mag. Nat. Hist., ser. 3, vol. 16, 1865, p. 27, pl. 1, fig. 36.—H. B. BRADY, Proc. Somerset Arch. and Nat. Hist. Soc., vol. 13, 1867, p. 109, pl. 2, fig. 22.—BALKWILL and WRIGHT, Proc. Roy. Irish Acad., ser. 2, vol. 3, 1882, p. 548.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 527, pl. 65, figs. 5, 6.—BALKWILL and WRIGHT, Trans. Roy. Irish Acad., vol. 28, 1885, p. 344, pl. 12, figs. 24, 25.—H. B. BRADY, Journ. Roy. Micr. Soc., 1887, p. 910.—PEARCEY, Trans. Glasgow, Nat. Hist. Soc., vol. 2, 1890, p. 178.—WRIGHT, Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 485.—ROBERTSON, Proc. Nat. Hist. Soc. Glasgow, pt. 3, 1892, p. 241.—HERON-ALLEN and EARLAND, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 97; Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 261.

Description.—Test elongate, tapering, cylindrical in transverse section; chambers in the early portion coiled, later portion uniserial, uncoiled, the last formed chamber fairly elongate, tapering to the aperture which is somewhat produced, radiate; sutures distinct, oblique, slightly depressed; wall smooth, finely punctate.

Length up to 2 mm.

Distribution.—This typical form of the species is recorded at numerous stations about the British Isles. There are numerous other records for it in the Atlantic, and numerous authors have referred to it specimens from various parts of the world. The only figures are those given by Balkwill and Wright, and they show a more nearly typical, more slender form than that found on the western side of the Atlantic which is here referred to the following variety.

MARGINULINA GLABRA D'Orbigny, var. OBESA, new variety.

Plate 37, fig. 1.

Marginulina glabra FLINT (not D'Orbigny), Rep. U. S. Nat. Mus., 1897 (1899), p. 183, pl. 60, fig. 1 (in part).

Description.—Variety differing from the typical in the larger size and much shorter, broader form.

Length up to 3 mm.

Distribution.—Type-specimen (U.S.N.M. Cat. No. 17489) from *Albatross* station D2043, in 1467 fathoms (2683 meters), off the northeastern coast of the United States. This larger, stouter form which may be referred to D'Orbigny's species as a variety, is very common at numerous stations around latitude 40 and longtiude 70, southwest of the New England coast, and runs south at occasional stations about the Gulf of Mexico and the Caribbean. Flint's stations for the species were mostly in this same region, and Brady records *M. glabra* from a *Challenger* station off New York where he presumably had this same large form. There are numerous other scattered records for the species in the *Challenger* report, and from off the coast of the British Isles, but specimens are not figured and it is very difficult to say just where they should belong without seeing the originals.

In the microspheric form of the species there are a few chambers which show the coiling condition, but in the megalospheric form specimens occur which, except for their association with the microspheric form and their slightly oblique sutures, might be referred to *Nodosaria.*

Marginulina glabra, var. obesa—*material examined.*

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
17482	U.S.N.M.	3	D2003....	37 16 30 N.; 74 20 36 W..	641	....	....	Few.
17483	U.S.N.M.	2	D2018....	37 12 22 N.; 74 20 04 W..	788	39.0	bu. m.......	Rare.
17484	U.S.N.M.	3	D2037....	38 53 00 N.; 69 23 30 W..	1,731	38.0	glob. oz.....	Few.
17485	U.S.N.M.	3	D2038....	38 30 30 N.; 69 08 25 W..	2,033	....	glob. oz.....	Few.
17486	U.S.N.M.	2	D2039....	38 19 26 N.; 68 20 20 W..	2,369	....	glob. oz.....	Rare.
17487	U.S.N.M.	7	D2041....	39 22 50 N.; 68 25 00 W..	1,608	38.0	glob. oz.....	Common.
17488	U.S.N.M.	3	D2042....	39 33 00 N.; 68 26 45 W..	1,555	38.5	glob. oz.....	Few.
17489	U.S.N.M.	6	D2043....	39 49 00 N.; 68 28 30 W..	1,467	38.5	glob. oz.....	Common.
17490	U.S.N.M.	1	D2046....	40 02 49 N.; 68 49 00 W..	407	40.0	bu. m.......	Rare.
17491	U.S.N.M.	5	D2105....	37 50 00 N.; 73 03 50 W..	1,395	41.0	glob. oz.....	Few.
17492	U.S.N.M.	1	D2138....	17 44 05 N.; 75 39 00 W..	23	....	co. brk. sh...	Rare.
17493	U.S.N.M.	1	D2189....	39 49 30 N.; 70 26 00 W..	600	39.7	gn. m., s....	Rare.
17494	U.S.N.M.	5	D2202....	39 38 00 N.; 71 39 45 W..	515	39.1	gn. m.......	Few.
17495	U.S.N.M.	4	D2203....	39 34 15 N.; 71 41 15 W..	705	38.9	gn. m., s....	Few.
17496	U.S.N.M.	1	D2204....	39 30 30 N.; 71 44 30 W..	728	39.1	br. m.......	Rare.
17497	U.S.N.M.	1	D2219....	39 46 22 N.; 69 29 00 W..	948	38.8	gy. m.......	Rare.
17498	U.S.N.M.	1	D2228....	37 25 00 N.; 73 06 00 W..	1,582	36.8	br. m.......	Rare.
17499	U.S.N.M.	1	D2231....	38 29 00 N.; 73 09 00 W..	965	36.8	gy. oz.......	Rare.
17500	U.S.N.M.	1	D2234....	39 09 00 N.; 72 03 15 W..	810	38.6	gn. m.......	Rare.
17501	U.S.N.M.	1	D2394....	28 38 30 N.; 87 02 00 W..	420	41.8	gn. m.......	Rare.
17502	U.S.N.M.	1	D2415....	30 44 00 N.; 79 26 00 W..	440	45.6	co. crs. s. sh.	Rare.
17503	U.S.N.M.	1	D2547....	39 54 30 N.; 70 20 00 W..	390	39.6	gn. m.......	Rare.
17504	U.S.N.M.	3	D2552....	39 47 07 N.; 70 35 00 W..	721	39.6	gy. oz.......	Few.
17505	U.S.N.M.	1	D2581....	39 43 00 N.; 71 34 00 W..	394	....	gn. m.......	Rare.
17506	U.S.N.M.	1	D2641....	25 11 30 N.; 80 10 00 W..	60	69.2	co. s........	Rare.
17507	U.S.N.M.	2	D2710....	40 06 00 N.; 68 01 00 W..	984	....	gn. m.......	Rare.

MARGINULINA BACHEII Bailey.

Plate 36, figs. 7–9.

Marginulina bacheii Bailey, Smithsonian Contrib., vol. 2, 1851, p. 10, pl., figs. 2–6.

Marginulina ensis Flint (not Reuss, 1846), Rep. U. S. Nat. Mus., 1897 (1899), p. 314, pl. 59, fig. 3.

Description.—Test much elongate, subcylindrical, only slightly tapering, often slightly curved, early portion somewhat compressed; chambers close-coiled, later portion uncoiled, chambers inflated, distinct, the ventral side somewhat lobulate, dorsal side much less so; sutures distinct, depressed; wall smooth, fairly thick; aperture eccentric, at the dorsal angle somewhat projecting, radiate.

Length 2.50–4 mm.

Distribution.—This species was originally described by Bailey from numerous stations southeast of Montauk Point, New York, to southeast of Cape Henlopen where, he says, "This fine species is one of the largest and most conspicuous forms in these soundings." Flint's specimens were from three *Albatross* stations, one off the Atlantic coast and about the latitude of New York, another off Cape Hatteras, and the third in the Gulf of Mexico, depths ranging from 58–160 fathoms (106–293 meters). The first two of these stations are in the area where this species occurs very abundantly. In the *Albatross* material that I have examined this species has been very abundant at several stations from about the latitude of Cape Cod, southward to the coast of Carolina, with a few specimens off Florida. It sometimes occurs in very considerable numbers and usually at moderate depths. In reviewing the literature the species does not seem to have been recorded in any recognizable form outside this general area.

The figures given by Bailey, while somewhat crude, show very well the general character of this species, and his designation of its occurrence, together with the very adequate description, make no question about referring these specimens from our Atlantic coast to his species.

Marginulina bacheii—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
17466	U.S.N.M.	1	D2063....	42 23 00 N.; 66 23 00 W..	141	46.0	s., crs., g....	Rare.
17467	U.S.N.M.	5	D2109....	35 14 20 N.; 74 59 10 W..	142	50.5	bu. m.......	Few.
17468	U.S.N.M.	5	D2242....	40 15 30 N.; 70 27 00 W..	58	51.4	gn. m.......	Few.
17469	U.S.N.M.	10+	D2243....	40 10 15 N.; 70 26 00 W..	63	52.4	gn. m.......	Abundant.
17470	U.S.N.M.	1	D2263....	37 08 00 N.; 74 33 00 W..	430	....	gn. m.......	Rare.
17471	U.S.N.M.	4	D2264....	37 07 50 N.; 74 34 20 W..	167	46.8	gy. s........	Few.
17472	U.S.N.M	2	D2265....	37 07 40 N.; 74 35 40 W..	70	57.9	gn. m., g....	Rare.
17473	U.S.N.M.	3	D2309....	35 43 30 N.; 74 52 00 W..	56	....	gy. s., brk. sh.	Few.
17474	U.S.N.M.	1	D2312....	32 54 00 N.; 77 53 30 W..	88	57.8	crs. s., bk. sp.	Rare.
17475	U.S.N.M.	8	D2313....	32 53 00 N.; 77 53 00 W..	99	57.2	crs. s., bk. sp.	Common.
17476	U.S.N.M.	10+	D2425....	36 20 24 N.; 76 46 30 W..	119	51.5	dk. gy. m., fne. s.	Abundant.
17477	U.S.N.M.	2	D2542....	40 00 15 N.; 70 42 20 W..	129	47.2	s., brk. sh....	Rare.
17478	U.S.N.M.	1	D2544....	40 01 45 N.; 70 24 00 W..	131	47.7	gn. s., bk. sp.	Rare.
17480	U.S.N.M.	1	D2679....	32 40 00 N.; 76 40 30 W..	782	38.6	lt. gy. oz....	Rare.
17481	U.S.N.M.	3	*Fish Hawk* 949.	....	......	....	....	Few.

MARGINULINA BACHEII Bailey, var. ENSIFORMIS (Goës).

Plate 37, fig. 3.

Cristellaria ensiformis Goës, Bull. Mus. Comp. Zoöl., vol. 29, 1896, p. 57, pl. 5, figs. 17, 18.

Description.—Variety differing from the typical in the somewhat smaller size and the development of numerous acicular spines about the early coiled portion.

Distribution.—Goës described this species from the Caribbean Sea in 196–210 fathoms (359–384 meters). I have had this variety from but one station in the material of the *Albatross* dredgings, which I have studied. This is from off the southern coast of Florida. It is to be suspected that the one station given by Flint from the northern part of the Gulf of Mexico for *Marginulina ensis* may be this variety. This variety evidently replaces the typical form in warmer waters.

Marginulina bacheii, var. ensiformis—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°*F.*		
17479	U.S.N.M.	3	D2648....	25 53 00 N.; 80 03 30 W..	84	....	gn. m.......	Few.

MARGINULINA STRIATULA Cushman.

Plate 37, fig. 4.

Marginulina striatula Cushman, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 79, pl. 23, fig. 4; Bull. 100, U. S. Nat. Mus., vol. 4, 1921, p. 255, pl. 41, fig. 2.

Description.—Test elongate, early part forming a portion of a coil, later chambers moniliform, tumid, separated by deep constrictions; wall typically with numerous very fine longitudinal striae; aperture at the end of a well-developed neck, eccentric on the dorsal side, radiate.

Length nearly 2 mm.

Distribution.—I originally described this species from a single *Nero* station, 2071, in 271 fathoms (496 meters), off the Hawaiian Islands. I have since had it from three stations in the Philippine region, ranging in depth from 78–554 fathoms (143–1012 meters). I have specimens from the Gulf of Mexico and Caribbean Sea which may be referred to this species; the Atlantic stations range from 169–683 fathoms (309–1,248 meters), but the species is rare at all the stations. It has not hitherto been recorded in the Atlantic.

This is another one of the examples of a species occurring in the Gulf of Mexico and Caribbean which has its range westward across the tropical Pacific.

Marginulina striatula—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°*F.*		
17508	U.S.N.M.	1	D2039....	38 19 26 N.; 68 20 20 W..	2,369	....	glob. oz.....	Rare.
17509	U.S.N.M.	1	D2117....	15 24 20 N.; 63 31 30 W..	683	39.8	yl. m. fne. s.	Rare.
17510	U.S.N.M	1	D2144....	9 49 00 N.; 79 31 30 W..	896	....	gn. m.......	Rare.
17511	U.S.N.M.	1	D2150....	13 34 45 N.; 81 21 10 W..	382	45.8	wh. crs. s....	Rare.
17512	U.S.N.M.	4	D2192....	39 46 30 N.; 70 14 45 W..	1,060	38.6	gy. oz.......	Few.
17513	U.S.N.M.	1	D2262....	39 54 45 N.; 69 29 45 W..	250	41.6	gn. m., s....	Rare.
17514	U.S.N.M.	1	D2377....	29 07 30 N.; 88 08 00 W..	210	67.0	gy. m.......	Rare.
17515	U.S.N.M.	2	D2398....	28 45 00 N.; 86 26 00 W..	227	48.6	gy. m.......	Rare.
17516	U.S.N.M.	2	D2400....	28 41 00 N.; 86 07 00 W..	169	....	gy. m.......	Rare.
17517	U.S.N.M	3	D2563....	39 18 30 N.; 71 23 30 W..	1,422	37.4	gy. oz.......	Few.
17518	U.S.N.M	1	D2573....	40 34 18 N.; 66 09 00 W..	1,742	37.3	gy. m., s....	Rare.

MARGINULINA COSTATA (Batsch).

Plate 37, fig. 2.

Nautilus (*Orthoceras*) *costatus* BATSCH, Conch. des Seesandes, 1791, p. 2, pl. 1, figs. 1 *a–g*.

Marginulina costata BRADY, Rep. Roy. *Challenger*, Zoology, vol. 9, 1884, p. 528, pl. 65, figs. 10–13 (?).—BALKWILL and WRIGHT, Trans. Roy. Irish Acad., vol. 28, 1885, p. 344.—PEARCEY, Trans. Glasgow Nat. Hist. Soc., vol. 2, 1890, p. 178.—WRIGHT, Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 485.—EGGER, Abh. kön. bay. Akad. Wiss. München, Cl. II, vol. 18, 1893, p. 347, pl. 11, fig. 19.—HERON-ALLEN and EARLAND, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 98; Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 261; Journ. Roy. Micr. Soc., 1916, p. 47.

I have given above the references to Atlantic material recorded under this name. There is evidently a difference in that found off the British Isles and the species found in the West Indies of which I have but a single specimen. Many different things have been referred to this specific name, and until a study can be made of the forms recorded from various regions the whole complex is in a very unsatisfactory state.

Marginulina costata—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
17519	U.S.N.M.	1	D2339....	° ′ ″ ° ′ ″ 23 10 40 N.; 82 20 15 W..	191	°F.	Co..........	Rare.

Genus VAGINULINA D'Orbigny, 1826.

Vaginulina D'ORBIGNY (type, *V. legumen* Linnaeus), Ann. Sci. Nat., vol. 7, 1826, p. 257.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 529.—CHAPMAN, The Foraminifera, 1902, p. 192.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 80.

Description.—Test elongate; chambers in a linear series, placed so that the sutures are oblique; aperture marginal; chambers laterally compressed.

The species of *Vaginulina* are undoubtedly derived from coiled forms, such as *Cristellaria*. Most of the fossil forms are compressed and very different from the recent species usually placed under this genus. The aperture usually is kept at the margin of the test, and the sutures oblique throughout.

It reaches its greatest development in the Mesozoic. Its geological history evidently ranges from the Lias to the present time.

VAGINULINA LEGUMEN (Linnaeus).

Plate 37, fig. 5.

Nautilus legumen LINNAEUS, Syst. Nat., ed. 10, 1758, p. 711, No. 248; ed. 12, 1767, p. 1164, No. 288.

Vaginulina legumen D'ORBIGNY, Ann. Sci. Nat., vol. 7, 1826, p. 257, No. 2.—BALKWILL and WRIGHT, Proc. Roy. Irish Acad., ser. 2, vol. 3, 1882, p. 58.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 530, pl. 66, figs. 13–15.—BALKWILL and WRIGHT, Trans. Roy. Irish Acad., vol. 28, 1885, p. 344.—H. B. BRADY, Journ. Roy. Micr. Soc., 1887, p. 910.—WRIGHT, Ann. Mag. Nat. Hist., vol. 4, ser. 6, 1889, p. 449; Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 484.—EGGER, Abh. kön. bay. Akad. Wiss. München, Cl. II, vol. 18, 1893, p. 347.—Goës, Bull. Mus. Comp. Zoöl., vol. 29, 1896, p. 58.—FLINT, Rep. U. S. Nat. Mus., 1897 (1899), p. 314, pl. 60, fig. 2.—WRIGHT, Irish Nat., vol. 11, 1902, p. 213.—CHAPMAN, The Foraminifera, 1902, p. 403.—MILLETT, Journ. Roy. Micr. Soc., 1902, p. 527, pl. 11, fig. 21.—EARLAND, Journ. Quekett Micr. Club, ser. 2, vol. 9, 1905, p. 215.—SIDEBOTTOM, Mem. Proc. Manchester Lit. Philos. Soc., vol. 51, No. 9, 1907, p. 6.—BAGG, Proc. U. S. Nat. Mus., vol. 34, 1908, p. 145.—CHAPMAN, Subantarctic Ids. New Zealand, 1909, p. 342; Journ. Linn. Soc. Zool., vol. 30, 1910, p. 412.—BAGG, Bull. 513, U. S. Geol. Survey, 1912, p. 63, pl. 18, figs. 6, 7.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 80, pl. 39, fig. 4.—HERON-ALLEN and EARLAND, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 98; Trans. Zool. Soc. London, vol. 20, 1915, p. 671; Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 261; Journ. Roy. Micr. Soc., 1916, p. 47.—MESTAYER, Trans. New Zealand Inst., vol. 48, 1916, p. 129.—CHAPMAN, Austral. Geol. Survey Bull. 72, 1917, p. 33, pl. 8, fig. 67.—SIDEBOTTOM, Journ. Roy. Micr. Soc., 1918, p. 139.—CUSHMAN, Proc. U. S. Nat. Mus., vol. 56, 1919, p. 618; Bull. 100, U. S. Nat. Mus., vol. 4, 1921, p. 257, pl. 41, fig. 3.

Description.—Test elongate, tapering, initial end usually with a spine; chambers increasing in diameter as added, oval in transverse section, later ones more distinct than the early ones; sutures often rather indistinct, oblique, later ones somewhat depressed; wall smooth, in small specimens usually thin, translucent, in older ones becoming thickened, opaque; aperture eccentric, slightly elongate, radiate.

Length of the largest Atlantic specimen 1.25 mm.

Distribution.—This species has occurred at several stations along the eastern coast of the United States and at two stations in the northern part of the Gulf of Mexico. Brady records it from one station off New York and at several other stations, one west of the Azores, one south of the Canary Islands, and one in the middle of the South Atlantic. Flint recorded it from the northern part of the Gulf of Mexico. It is recorded by numerous authors off the coasts of the British Isles. There are many other records for this species outside the Atlantic as the above references show.

oblique costae, which in the adult do not reach the last-formed chambers.

Length up to 4 mm.

Distribution.—Type-specimen (U.S.N.M. Cat. No. 17404) from *Albatross* station D2415, in 440 fathoms (805 meters), off the coast of northern Florida. This is evidently the species described and figured by Flint as *V. linearis*. It is probably also the same as the *Challenger* material referred by Brady to *V. linearis*, but who mentions that "the specimens are few in number and are hardly ever typical as to minor characters." The specimens were from off Bermuda. 435 fathoms (796 meters), off Culebra Island, 390 fathoms (713 meters), and off the coast of South America, southeast of Pernambuco; 350 fathoms (640 meters). Flint's specimens were from off the coast of Georgia and Florida, 37–276 fathoms (68–505 meters). Goës may have had this species from the Caribbean, mentioning one as "only being perhaps more cylindric in the circumference" than the typical. I have had specimens from several *Albatross* stations which are given in the accompanying table. They range from Florida along the eastern coast of the United States, the specimens being most abundant off the coast of Georgia, where they are also recorded by Flint.

This species has a rounded base and is much more cylindrical than *V. linearis*.

Vaginulina americana—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
17415	U.S.N.M.	4	D2314....	32 43 00 N.; 77 51 00 W..	159	47.4	crs. s., bk. sp.	Few.
17404 17416	U.S.N.M.	8	D2415....	30 44 00 N.; 79 26 00 W..	440	45.6	co., crs. s....	Common.
17417	U.S.N.M.	7	D2416....	31 26 00 N.; 79 07 00 W..	276	53.8	co., brk. sh..	Frequent.
17418	U.S.N.M.	1	D2668....	30 58 30 N.; 79 38 30 W..	294	46.3	gy. s., dd. co.	Rare.
17419	U.S.N.M.	1	D2710....	40 06 00 N.; 68 01 00 W..	984	....	gn. m.......	Rare.

VAGINULINA BERMUDENSIS, new species.

Plate 38, fig. 2.

Nodosarina legumen Linnaeus, var. *linearis* Goës (part), Kongl. Svensk. Vet. Akad. Handl., vol. 19, No. 4, 1882, p. 39, pl. 2, fig. 32 (not 33, 35).

Description.—Test elongate, curved, especially near the initial end, circular in transverse section, initial end broadly rounded, in the adult consisting of about 12 chambers; chambers very slightly inflated toward the apertural end; sutures rather indistinct, except in the later portion where they are slightly depressed, only slightly oblique; wall ornamented by very numerous fine longitudinal costae which are continuous across the chambers and run from the initial end to the aperture, increasing in number as the size of the test increases, becoming finer toward the apertural end; aperture fairly large, at one side, radiate.

Length up to 7 mm.

Distribution.—Type-specimen from Challenger Bank, off the Bermudas, collected by Owen Bryant, collection of J. A. Cushman.

VAGINULINA LINEARIS (Montagu).

Plate 16. figs. 7–9.

Nautilus linearis Montagu, Test. Brit. Suppl., 1808, p. 87, pl. 30, fig. 9.

Dentalina legumen (Linnaeus), var. *linearis* Williamson, Rec. Foram. Great Britain, 1858, p. 22, pl. 2, figs. 46–48.

Vaginulina linearis Parker and Jones, Philos. Trans., vol. 155, 1865, p. 343, pl. 13, figs. 12, 13.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 532, pl. 67, figs. 10–12.—Balkwill and Wright, Proc. Roy. Irish Acad., ser. 2, vol. 3, 1882, p. 548; Trans. Roy. Irish Acad., vol. 28, 1885, p. 344.—H. B. Brady, Journ. Roy. Micr. Soc., 1887, p. 910.—Pearcey, Trans. Glasgow Nat. Hist. Soc., vol. 2, 1890, p. 178.—Wright, Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 484; Irish Nat., vol. 11, 1902, p. 213.—Goës, Kongl. Svensk. Vet. Akad. Handl., vol. 25, No. 9, 1894, p. 66, pl. 12, fig. 664.—Heron-Allen and Earland, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 98; Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 261.

Description.—Test elongate, somewhat curved, initial end pointed with a short spine, whole test somewhat compressed; chambers comparatively few, about 10 in a fully grown specimen, inflated, especially toward the apertural end, earlier chambers more compressed; sutures distinct but only depressed toward the apertural end; surface ornamented by numerous somewhat oblique longitudinal lines, usually not extending out on to the last-formed chamber; aperture at the dorsal side, somewhat projecting, radiate.

Length up to about 3 mm.

Distribution.—This species described by Montagu from the shores of the British Isles seems to be restricted to the European side of the North Atlantic. It has been recorded by numerous authors from this general region. Its northernmost record is that of Parker and Jones from between Drontheim and North Cape. Some of the records given by Wright off the British Isles are as much as 50 fathoms (91 meters). In the *Challenger* report Brady mentions it from the Shetlands and Hebrides at depths of 15–90 fathoms (27–165 meters) where it is common, and states that it also occurs off the coasts of Norway and France, but that the *Challenger* material which he had from the western Atlantic was not typical. That material has been placed in the following species:

VAGINULINA SPINIGERA H. B. Brady.

Plate 37, figs. 6–8; pl. 38, fig. 1.

Marginulina, species, WHITEAVES, Rep. British Association, Brighton Meeting, Trans., 1872, p. 144.

Vaginulina spinigera H. B. BRADY, Quart. Journ. Micr. Sci., vol. 21, 1881, p. 63; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 531, pl. 67, figs. 13, 14.—WRIGHT, Ann. Mag. Nat. Hist., vol. 4, ser. 6, 1889, p. 449.—PEARCEY, Trans. Glasgow Nat. Hist., vol. 2, 1890, p. 178.—FLINT, Rep. U. S. Nat. Mus., 1897 (1899), p. 314, pl. 60, fig. 3.—WHITEAVES, Geol. Survey Canada, 1901, p. 10.—CUSHMAN, Bull. 100, U. S. Nat. Mus., vol. 4, 1921, p. 259, pl. 42, fig. 1.

Description.—Test elongate, tapering, gradually increasing in diameter toward the apertural end, near the initial end are typically two long acicular spines, sometimes nearly half the length of the test itself, at widely divergent angles; chambers fairly numerous, the early ones coiled, the later ones uncoiled, oblique, the dorsal side higher than the ventral; sutures distinct, somewhat limbate, occasionally showing a slight tendency toward beading and the last-formed chambers sometimes depressed; aperture at the dorsal margin of the last-formed chamber, slightly projecting, radiate.

Length without the spines up to 5 mm.

Distribution.—This species was originally described by Whiteaves from the Gulf of St. Lawrence but he did not give it a specific name. M. Sars gave a name *Marginulina spinosa* in one of his lists from off the coast of Norway, but as no description or figure was given, the name has not been used. Brady described the species in 1881 and figured it in the *Challenger* report for the first time. The *Challenger* records are three—off the coast of South America, near Pernambuco, Brazil, 675 fathoms (1,234 meters), and from two in the Pacific, off Sydney, New South Wales, 410 fathoms (750 meters), and north of the Ki Islands, 580 fathoms (1,061 meters). Wright records the species as rare, off the southwest coast of Ireland, 1,000 fathoms (1,829 meters). Pearcey records a few from the warm area of the Faroe Channel. Flint recorded it from two stations off the northeastern coast of the United States in 328 and 430 fathoms (600 and 805 meters). Another record is that which I have given from off Bouro Island, at *Albatross* station D5637, in 700 fathoms (1,280 meters). This is not far from one of the *Challenger* stations.

There is some variation in the spines developed at the base of the test. The typical form has two, usually widely divergent, but occasionally a third is developed, more nearly in the axis of the test—very rarely the spines themselves are bifurcate. In specimens which are evidently senescent there is a reduction in the width of the final chamber.

Vaginulina spinigera—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
17385	U.S.N.M.	6	D2003	37 16 30 N.; 74 20 36 W.	641	....	....	Frequent.
17386	U.S.N.M.	1	D2018	37 12 22 N.; 74 20 04 W.	788	39.0	bu. m	Rare.
17387	U.S.N.M.	1	D2048	40 02 00 N.; 68 50 30 W.	547	29.0	crs.s., m.&g.	Rare.
17388	U.S.N.M.	1	D2052	39 40 05 N.; 69 21 25 W.	1,098	45.0	glob. oz	Rare.
17389	U.S.N.M.	2	D2072	41 53 00 N.; 66 35 00 W.	858	39.0	gy. m	Rare.
17390	U.S.N.M.	1	D2073	41 54 15 N.; 65 39 00 W.	587	40.0	gy. s	Rare.
17391	U.S.N.M.	1	D2110	35 12 10 N.; 74 57 15 W.	516	40.0	bu. m	Rare.
17392	U.S.N.M.	2	D2115	35 49 30 N.; 74 34 45 W.	843	39.0	m., fne. s	Rare.
17393	U.S.N.M.	10	D2171	37 59 30 N.; 73 48 40 W.	444	39.5	gn. m	Common.
17394	U.S.N.M.	8	D2172	38 01 15 N.; 73 44 00 W.	568	39.0	gn. m	Common.
17395	U.S.N.M.	1	D2189	39 49 30 N.; 70 26 00 W.	600	39.7	gn. m., s	Rare.
17396	U.S.N.M.	7	D2202	39 38 00 N.; 71 39 45 W.	515	39.1	gn. m	Frequent
17397	U.S.N.M.	10+	D2203	39 34 15 N.; 71 41 15 W.	705	38.9	gn. m., s	Abundant.
3089	U.S.N.M.							
3090	U.S.N.M.							
17398	U.S.N.M.	9	D2212	39 59 30 N.; 70 30 45 W.	428	40.0	gn. m	Common.
17399	U.S.N.M.	10+	D2213	39 58 30 N.; 70 30 00 W.	384	39.5	gn. m	Abundant.
17400	U.S.N.M.	3	D2214	39 57 00 N.; 70 32 00 W.	475	39.5	gn. m	Few.
17401	U.S.N.M.	5	D2234	39 09 00 N.; 72 03 15 W.	810	38.6	gn. m	Frequent.
17402	U.S.N.M.	1	D2263	37 08 00 N.; 74 33 00 W.	430	....	gn. m	Rare.
17403	U.S.N.M.	1	D2352	22 35 00 N.; 84 23 00 W.	463	45.0	wh. co	Rare.
17405	U.S.N.M.	1	D2541	39 57 45 N.; 70 50 30 W.	134	47.7	gn. s., brk. sh.	Rare.
17406	U.S.N.M.	2	D2544	40 01 45 N.; 70 24 00 W.	131	47.7	gn. s., bk. sp.	Rare.
17407	U.S.N.M.	10+	D2547	39 54 30 N.; 70 20 00 W.	390	39.6	gn. m	Abundant.
17408	U.S.N.M.	3	D2552	39 47 07 N.; 70 35 00 W.	721	39.6	gy. oz	Few.
17409	U.S.N.M.	1	D2586	39 02 40 N.; 72 40 00 W.	328	40.2	gn. m	Rare.
17410	U.S.N.M.	2	D2677	32 39 00 N.; 76 50 30 W.	478	39.3	gn. m	Rare.
17411	U.S.N.M.	10	D2682	39 38 00 N.; 70 22 00 W.	990	....	gn. m	Abundant.
17412	U.S.N.M.	10+	D2689	39 42 00 N.; 71 15 30 W.	525	....	gn. m	Abundant.
17413	U.S.N.M.	1	D2710	40 06 00 N.; 68 01 00 W.	984	....	gn. m	Rare.

Genus FRONDICULARIA Defrance, 1824.

Frondicularia DEFRANCE (type, *F. complanata* Defrance), Dict. Sci. Nat., vol. 32, 1824, p. 178.

Description.—Test compressed, in the adult consisting of chambers, elongate and narrow, running back on either side of the test; wall vitreous, finely perforate; aperture single, either radiate or surrounded with a lip which is usually cut in a radial manner; surface smooth or ornamented with costae; microspheric specimens with a coiled development in the earlier chambers; megalospheric specimens without the coiled chambers as a rule.

The genus *Frondicularia* is evidently derived from a coiled ancestry, such as *Cristellaria.* The microspheric forms invariably show coiled chambers in the young, and were formerly placed under the genus *Flabellina.* Megalospheric specimens of the same species often show typical adult characters appearing directly after the proloculum.

Its geological history ranges from the Permian to the present. It is particularly abundant in the Cretaceous. At the present time large typical *Frondicularia* species are comparatively rare. There is a development of it in the warmer waters of the western Atlantic, and in tropical and subtropical waters of the Pacific at depths of 100–500 fathoms (183–914 meters). *Frondicularia advena* is found in deeper waters and is rather widely distributed. There are several species which have been referred to this genus in recent years which possibly should not be placed here. They are small, thin-walled species, described from the Mediterranean or the eastern North Atlantic, in which there is a compressed form, but the typical inverted V-shaped chamber is not characteristically developed. These species, moreover, instead of having the typical radiate aperture characteristic of *Frondicularia*, more often have a small aperture, and it seems that they should be studied to see whether or not they really belong to this genus.

FRONDICULARIA [?] TRANSLUCENS Heron-Allen and Earland.

Plate 21, fig. 4.

Frondicularia translucens HERON-ALLEN and EARLAND, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 96, pl. 8, fig. 13.

Description.—"Test minute, ovate, compressed, rounded at both ends, and at the marginal edges, showing 3–4 chambers. The initial chamber large, inflated, lenticular in shape. Sutural lines somewhat obscure, especially in the later chambers. Shell walls transparent; surface minutely punctate; aperture a slit furnished with a curved entosolenian tube.

"Length 0.14–0.16 mm.; breadth 0.10–0.12 mm."

Distribution.—This species was described by the authors from Inishgoula Harbor, Ireland, in 14 fathoms.

It seems questionable whether this should be referred to *Frondicularia* or not.

FRONDICULARIA [?] SIDEBOTTOMI, new name.

Plate 21, fig. 6.

Frondicularia spathulata SIDEBOTTOM (not Williamson), Mem. Proc. Manchester Lit. Philos. Soc., vol. 51, 1907, p. 5, pl. 1, fig. 26.—HERON-ALLEN and EARLAND, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 97, pl. 8, fig. 12; Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 260.

Description.—Test minute, hyaline, compressed, periphery rounded, lobulate; chambers in a straight axis, increasing in breadth as added; sutures distinct, slightly depressed; wall smooth; aperture simple, elliptical, often with an entosolenian neck.

Length of British specimens 0.20–0.35 mm.

Distribution.—Heron-Allen and Earland record this from five stations in the Clare Island region of Ireland in muddy localities. They also note its occurrence in the muddier dredgings from shallow water around the north and west coasts of Scotland and in the North Sea. Sidebottom figured the species from the coast of the Island of Delos. He referred to the same species a specimen from the Bay of Palermo,[71] but this has a different shape and an exserted neck and does not appear to be the same species.

The name *Frondicularia spathulata* was first used by Williamson for a species of a very different form from the British Coast which does not appear to have been since recorded. Brady used the same name for a species of a different form occurring in the Indo-Pacific which I have named *F. bradyi* Cushman. The specific name *spathulata* being preoccupied in this genus, I have given the above name to the species of the Mediterranean and the coast of western Europe.

FRONDICULARIA [?] PYGMAEA Sidebottom.

Plate 21, fig. 3.

Frondicularia pygmaea SIDEBOTTOM, Mem. Proc. Manchester Lit. Philos. Soc., vol. 51, no. 9, 1907, p. 5, pl. 1, fig. 27.—HERON-ALLEN and EARLAND, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 96, pl. 8, fig. 14.

Description.—" The initial chamber appears to be nearly globular, and the following ones are compressed, narrow and reflexed. The septa are arched, and slightly sunk, and the orifice is simple. A small wing commencing on the last chamber but one runs on either side of the test, gradually broadening out and terminating as a spine. The initial chamber is likewise armed with a small spine. Two specimens were found and both consist of five chambers."

Length of Delos figured specimen 0.20 mm.; off Clare Island specimen about 0.15 mm.

Distribution.—Sidebottom originally described this species from the coast of the Island of Delos in the Mediterranean. Heron-Allen and Earland record it from the Clare Island region, off Ireland, and Earland had it from off Noss Head, Moray Firth.

The microspheric form has a straight test without sign of coiling as does the megalospheric. It seems to belong rather to *Lingulina* than to *Frondicularia.*

FRONDICULARIA ADVENA, new species.

Plate 20, figs. 1, 2.

Frondicularia inaequalis H. B. BRADY (not Costa), Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 521, pl. 66, figs. 8-12.—FLINT, Rep. U. S. Nat. Mus., 1897 (1899), p. 313, pl. 59, fig. 2.—CUSHMAN, Bull. 100, U. S. Nat. Mus., vol. 4, 1921, p. 216, pl. 40, figs. 5, 6.

Description.—Test compressed, irregularly elliptical, initial end usually narrow, bluntly pointed, proloculum subspherical, following chambers coiled in part or not at all, quickly giving place to typical V-shaped frondicularian chambers, highest in the center, thence gradually tapering to the pointed lower ends; test occasionally with a slight peripheral keel, sutures slightly depressed; aperture circular in the center of the periphery of the last-formed chamber; surface of test smooth and unornamented; wall translucent, thin.

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[71] Mem. Proc. Manchester Lit. Philos. Soc., vol. 54, No. 16, 1910, p. 21, pl. 2, fig. 22.

Length 0.5–2 mm.

Description.—Type-specimen (U.S.N.M. Cat. No. 17526) from *Albatross* station D2205, in 1073 fathoms (1962 meters), off the northeastern coast of the United States. The only *Challenger* record for this species is off New York in 1,240 fathoms (2,268 meters). Flint has also recorded it in the same general area from two *Albatross* stations, D2530 and D2584, in 956 and 541 fathoms (1,748 and 989 meters). I have had it from numerous stations, most of them in the general latitude of New York, but one off Cape Hatteras, depths ranging from 168–1,362 fathoms (307–2,491 meters). There is a development of this species in the Indo-Pacific region, Brady giving the following *Challenger* stations: Near the Ki Islands at depths of 129 and 580 fathoms (236 and 1,061 meters); off Raine Island, Torres Strait, 155 fathoms (283 meters); and off the west coast of New Zealand, 275 fathoms (503 meters). He also gives another station off the Cape of Good Hope, 150 fathoms (274 meters). I have had what seems to be identical material from *Albatross* station D5123, east coast of Mindoro, Philippine Islands, in 283 fathoms (517 meters), and from D5652, in the Gulf of Boni, Philippine Islands, in 525 fathoms (927 meters). This therefore seems to be another one of those species which occurs at considerable depths, both in the Western Atlantic and the Indo-Pacific. Heron-Allen and Earland have recorded a single imperfect specimen, fossil, from a clay which occurred in the shore sands of Selsey Bill. Sussex, England.[72] Bagg has recorded it as abundant from the Pliocene at San Pedro, California,[73] but his figures show very conclusively that it is an entirely different species from this. It is a small, delicate species, and very apt to be broken.

Frondicularia advena—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
17520	U.S.N.M.	1	D2035	39 26 16 N.; 70 02 37 W.	1,362	....	glob. oz	Rare.
17521	U.S.N.M.	1	D2050	39 42 50 N.; 69 21 20 W.	1,050	44.5	glob. oz	Rare.
17522	U.S.N.M.	1	D2093	39 42 50 N.; 71 01 20 W.	1,000	39.0	for., s., m.	Rare.
17523	U.S.N.M.	1	D2192	39 46 30 N.; 70 14 45 W.	1,060	38.6	gy. oz	Rare.
17524	U.S.N.M.	10+	D2202	39 38 00 N.; 71 39 45 W.	515	39.1	gn. m	Abundant.
17525	U.S.N.M.	1	D2203	39 34 15 N.; 71 41 15 W.	705	38.9	gn. m., s.	Rare.
17526	U.S.N.M.	2	D2205	39 35 00 N.; 71 18 45 W.	1,073	38.1	gy. oz	Few.
17527	U.S.N.M.	3	D2205	....	....	....	....	
17528	U.S.N.M.	1	D2212	39 59 30 N.; 70 30 45 W.	428	40.0	gn. m	Rare.
17529	U.S.N.M.	1	D2552	39 47 07 N.; 70 35 00 W.	721	39.6	gy. oz	Rare.
17530	U.S.N.M.	4	D2581	39 43 00 N.; 71 34 00 W.	394	....	gn. m	Few.
17531	U.S.N.M.	1	D2614	34 09 00 N.; 76 02 00 W.	168	....	gy. s., bk. sp.	Rare.
17532	U.S.N.M.	1	D2684	39 35 00 N.; 70 54 00 W.	1,106	....	br. c., bk. sp.	Rare.
17533	U.S.N.M.	1	D2748	39 31 00 N.; 71 14 30 W.	1,163	37.8	gy. m., for.	Rare.

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[72] Journ. Roy. Micr. Soc., 1907, p. 427.

[73] Bull. 513, U. S. Geol. Survey, 1912, p. 60, pl. 18, figs. 1 *a–e*, 2 *a–e*.

FRONDICULARIA SAGITTULA Vanden Broeck.

Plate 21, fig. 2.

Frondicularia alata D'ORBIGNY, var. *sagittula* VANDEN BROECK, Ann. Soc. Belg. Micr., vol. 2, 1876, p. 118, pl. 2, figs. 12, 14.

Description.—Test flattened, triangular in outline; chambers at the initial end gradually increasing in length posteriorly so as to form an angle from the initial chamber as its apex, apertural end bluntly pointed, chambers narrow, of uniform width throughout, the initial ends often with short blunt conical spines extending backward; wall smooth; sutures strongly limbate, distinct, sometimes slightly raised above the general surface; aperture terminal, radiate.

Length up to 4 mm.

Distribution.—This species, originally described by Vanden Broeck, is a variety of *F. alata* D'Orbigny. It occurs sparingly in the Gulf of Mexico, and in a still more definite form in the Bowden Marl, Bowden, Jamaica.

The following variety is more common.

Frondicularia sagittula—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
17534	U.S.N.M.	1	D2377....	29 07 30 N.; 88 08 00 W..	210	67.0	gy. m.......	Rare.
17535	U.S.N.M.	1	D2400....	28 41 00 N.; 86 07 00 W..	169	....	gy. m.......	Rare.

FRONDICULARIA SAGITTULA Vanden Broeck, var. LANCEOLATA Vanden Broeck.

Plate 20, fig. 4; pl. 21, fig. 1.

Frondicularia alata D'ORBIGNY, var. *lanceolata* VANDEN BROECK, Ann. Soc. Belg. Micr., vol. 2, 1876, p. 117, pl. 2, fig. 13.

Frondicularia alata H. B. BRADY (not D'Orbigny), Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 522, pl. 65, figs. 20–23; pl. 66, figs. 3–5.—GOËS, Bull. Mus. Comp. Zoöl., vol. 29, 1896, p. 65.—FLINT, Rep. U. S. Nat. Mus., 1897 (1899), p. 313, pl. 59, fig. 1.—CUSHMAN, Publ. 291, Carnegie Inst. Washington, 1919, p. 36, pl. 8, fig. 1.

Nodosarina complanata GOËS (not *Frondicularia complanata* Defrance), Kongl. Svensk. Vet. Akad. Handl., vol. 19, No. 4, 1882, p. 56, pl. 3, figs. 62–64.

Description.—Variety differing from the typical in the form which is much broader, the base usually either a straight line or the chambers not reaching to the base, giving it a rounded form; chambers usually broader than the typical and often with a single stout spine developed from the proloculum.

Length up to nearly 5 mm.

Distribution.—This variety which is described by Vanden Broeck from off the Barbadoes in 84 fathoms (153 meters), is much more common than the typical form. It has occurred at several stations in the *Albatross* collection from the Gulf of Mexico and off the Florida coast. Brady recorded this species from off Culebra Island, West Indies, 395 fathoms (721 meters), and from off Bermuda, 435 fathoms (796 meters). Flint has recorded it at 198 and 210 fathoms (363 and 384 meters), at stations D2399 and D2377, from both of which I have also had material. The records of Goës are from the Caribbean, 300-400 fathoms (549-732 meters). It seems therefore to be a species confined to the warmer portions of the western Atlantic and which is developed at depths ranging from 100-400 fathoms (183-732 meters).

The microspheric form of this species has the chambers arranged in a coiled fashion and in such specimens a much more pointed form is usually given to the base of the test. This is shown in some of the early figures given by Goës, and is here shown, plate 21, figure 1.

This does not seem to be identical with the form named by D'Orbigny, *Frondicularia alata*, from the Mediterranean.

Frondicularia sagittula, var. lanceolata—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance
				° ′ ″ ° ′ ″		°F.		
17536	U.S.N.M.	1	D2315....	24 26 00 N.; 81 48 15 W..	37	....	co...........	Rare.
17537	U.S.N.M.	1	D2355....	20 56 48 N.; 86 27 00 W..	399	....	yl. oz........	Rare.
17538	U.S.N.M.	1	D2377....	29 07 30 N.; 88 08 00 W..	210	67.0	gy. m.......	Rare.
17539	U.S.N.M.	4	D2399....	28 44 00 N.; 86 18 00 W..	196	51.6	gy. m.......	Few.
17540	U.S.N.M.	1	D2400....	28 41 00 N.; 86 07 00 W..	169	....	gy. m.......	Rare.
17541	U.S.N.M.	1	D2641....	25 11 30 N.; 80 10 00 W..	60	69.2	co. s.........	Rare.

FRONDICULARIA, species?

Plate 20, fig. 3.

I have a single specimen of a peculiar species of *Frondicularia* from *Albatross* station D2192, off the northeastern coast of the United States, in 1,060 fathoms (1,938 meters). It is here figured.

The surface has costae which stand above the general surface of the test and which are sharp and plate-like. No other Atlantic specimens were obtained.

Frondicularia, species—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
17542	U.S.N.M.	1	D2192....	39 46 30 N.; 70 14 45 W..	1,060	38.6	gy. oz.......	Rare.

FRONDICULARIA [?] TENERA (Bornemann).

Plate 21, fig. 5.

Under this name Heron-Allen and Earland record and figure[74] a single specimen from off the west coast of Scotland. There seems to be some doubt as to the exact origin of this specimen and whether it might have been a fossil or not.

Subfamily 3. POLYMORPHININAE.

Test polythalamous; chambers usually arranged in an irregular spiral, in later growth sometimes approaching a biserial arrangement or sometimes uniserial; surface smooth or ornamented by spines or costae; aperture radiate.

This subfamily includes the genus *Polymorphina* and its closely allied form *Dimorphina*.

Genus POLYMORPHINA D'Orbigny, 1826.

Polymorphina D'ORBIGNY, Ann. Sci. Nat., vol. 7, 1826, p. 265.—H. B. BRADY, PARKER, and JONES, Trans. Linn. Soc. London, vol. 27, 1870, p. 197, et seq.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 557.—CHAPMAN, The Foraminifera, 1902, p. 199.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 83.

Description.—Test more or less rounded, usually not equilateral; chambers few, obliquely placed in a more or less spiral arrangement; aperture terminal, radiate; wall calcareous, perforate, either smooth or variously ornamented with spines, costae, or tubercles.

D'Orbigny divided this genus into several subgenera, none of which are at the present time recognized. The literature of this particular genus is more complicated than that of most of the genera, due largely to the fact that so many of the species have a smooth wall without ornamentation and specific characters have to be based almost entirely on the outline and arrangement of the chambers of the test. Allowing for the variation thought to occur in this and other groups of earlier authors, and the lack of close application of names in later work, the number of forms placed under almost any of the smooth species is very great.

With the limited material at my disposal it is impossible to work out many of these complex cases. I have therefore thought it best simply to give the references under the various names to the Atlantic records for the various species, and wait for the future to work out their real relations. That the species of *Polymorphina* are probably as well characterized in their distribution as are other species of other genera may be shown by such well characterized species as *Polymorphina myristiformis* Williamson. This species, which has a peculiar ornamentation, occurs in considerable numbers in a very limited distribution about the British Isles and Western Europe, possibly also in the Mediterranean. It seems therefore that other species of this genus when their characters are clearly defined and plenty of material is available for examination, will be found to have distributions equally clearly delimited, as in the case of other species of the foraminifera.

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[74] Trans. Linn. Soc. London, ser. 2, vol. 2, 1916, p. 260, pl. 42, figs. 8–10.

POLYMORPHINA LACTEA (Walker and Jacob).

Plate 39, figs. 9, 11.

"Serpula tenuis ovalis laevis" Walker and Boys, Test. Min., 1784, p. 2, pl. 1, fig. 5.

"Polymorpha Subcordiformia vel Oviformia" Soldani, Testaceographia, vol. 1, pt. 2, 1791, p. 114, pl. 112, figs. 11, *nn*, etc.

Serpula lactea Walker and Jacob, Adams' Essays, ed. 2, 1798, p. 634, pl. 24, fig. 4.

Vermiculum lacteum Montagu, Test. Brit., 1803, p. 522.

Polymorphina lactea Macgillivray, Moll. Aberd., 1843, p. 320.—Williamson (part), Rec. Foram. Great Britain, 1858, p. 71, pl. 6, fig. 147.—(The following are Atlantic records referred to this species).—Balkwill and Wright, Proc. Roy. Irish Acad., ser. 2, vol. 3, 1882, p. 549.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 559.—Balkwill and Wright, Trans. Roy. Irish Acad., vol. 28, 1885, p. 345.—H. B. Brady, Journ. Roy. Micr. Soc., 1887, p. 912.—H. B. Brady, Parker, and Jones, Trans. Zool. Soc., London, vol. 12, 1888, p. 224, pl. 44, fig. 11.—Pearcey, Trans. Glasgow Nat. Hist. Soc., vol. 2, 1890, p. 178.—Wright, Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 486.—Woodward, The Observer, vol. 4, 1893, p. 144.—Wright, Irish Nat., vol. 9, No. 3, 1900, p. 54.—Whiteaves, Geol. Survey Canada, 1901, p. 10.—Earland, Journ. Quekett Micr. Club, ser. 2, vol. 9, No. 57, 1905, p. 216.—Balkwill and Millett, Recent Foram. Galway, 1908, p. 6.—Heron-Allen and Earland, Journ. Roy. Micr. Soc., 1907, p. 430; Proc. Roy Irish Acad., vol. 31, pt. 64, 1913, p. 100, pl. 8, fig. 16; Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 264; Journ. Roy. Micr. Soc., 1916, p. 48.

The figure of Williamson may be taken as a typical western European form of this species. Under this name in the literature are to be found a considerable collection of figures covering a variety of things not all of which certainly can be one species. Such forms as that figured by Williamson occur on the coast of the British Isles, and I have specimens of similar form from Iceland.

On the western side of the Atlantic another form is common in shallow water especially off the New England coast. This is here described.

POLYMORPHINA LACTEA (Walker and Jacob), var. NOVANGLIAE, new variety.

Plate 39, figs. 6-8.

Polymorphina lactea Cushman (not Walker and Jacob), Proc. Boston Soc. Nat. Hist., vol. 34, 1908, p. 28.

Description.—Variety differing from the typical in the form of the test which is elongate, fusiform, the initial end rounded, apertural end slightly drawn out, wall smooth; sutures not depressed.

Length up to 2 mm.

Distribution.—Type-specimen from Cobscook Bay, near Eastport, Maine. I have had other specimens from off Trials Island, Eastport, and Casco Bay, Maine, shore sands from Coffins Beach, Annisquam, Massachusetts, and Newport, Rhode Island, and from the Woods Hole region, all on the New England coast. It has also occurred in Gaspé Bay, 30–40 fathoms (55–73 meters). This variety apparently does not occur in the *Albatross* material of deeper water farther south.

A specimen of a fistulose form is figured (plate 39, fig. 8) which may possibly belong to this species. It is from off the New England coast, *Albatross* station D2097.

Polymorphina lactea, var. novangliae—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance
				° ′ ″ ° ′ ″		°F.		
17714	U.S.N.M.	1	D2097....	37 56 20 N.; 70 57 30 W..	1,917	....	glob. oz.....	Rare.
17715	U.S.N.M.	1	D2105....	37 50 00 N.; 73 03 50 W..	1,395	41.0	glob. oz.....	Rare.
17716	U.S.N.M.	1	D2568....	39 15 00 N.; 68 08 00 W..	1,781	36.9	gy. oz.......	Rare.

POLYMORPHINA LACTEA (Walker and Jacob), var. OBLONGA Williamson.

Plate 40. figs. 7, 8.

Polymorphina lactea (WALKER and JACOB), var. *oblonga* WILLIAMSON, Rec. Foram. Great Britain, 1858, p. 71, pl. 6, figs. 149, *a*.—H. B. BRADY, Journ. Roy. Micr. Soc., 1887, p. 913.—WRIGHT, Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 486; Irish Nat., vol. 9, No. 3, 1900, p. 54.—EARLAND, Journ. Quekett Micr. Club, ser. 2, vol. 9, No. 57, 1905, p. 216.—BALKWILL and MILLETT, Rec. Foram. Galway, 1908, p. 6.

Polymorphina oblonga BALKWILL and WRIGHT, Proc. Roy. Irish Acad., ser. 2, vol. 3, 1882, p. 549; Trans. Roy. Irish Acad., vol. 28, 1885, p. 346.—ROBERTSON, Proc. Nat. Hist. Soc. Glasgow, pt. 3, 1892, p. 241.—HERON-ALLEN and EARLAND, Journ. Roy. Micr. Soc., 1907, p. 430; Proc. Roy. Irish Acad., vol. 31, pt. 63, 1913, p. 100, pl. 8, fig. 17; Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 264; Journ. Roy. Micr. Soc., 1916, p. 48.

This form described by Williamson from off the coast of the British Isles, has been recorded by numerous authors from the same general region, as given in the references above. I have not found it in the western Atlantic. Sidebottom records the variety from the Mediterranean, but in both cases says that the material is not typical. There are scattered records for it elsewhere.

POLYMORPHINA COMMUNIS D'Orbigny.

Plate 40. figs. 1, 2.

Polymorphina (*Guttulina*) *communis* D'ORBIGNY, Ann. Sci. Nat., vol. 7, 1826, p. 266, pl. 12, figs. 1–4; Modèle, No. 62.

Guttulina communis D'ORBIGNY, Foram. Foss. Vienne, 1846, p. 224, pl. 13, figs. 6–8.

Polymorphina communis H. B. Brady, Parker, and Jones, Trans. Linn. Soc. London, vol. 27, 1870, p. 224, pl. 39, figs. 10*a*, *b*.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 568, pl. 72, fig. 19.—Flint, Rep. U. S. Nat. Mus., 1897 (1899), p. 319, pl. 67, fig. 6.—Wright, Irish Nat., vol. 9, No. 3, 1900, p. 55.—Heron-Allen and Earland, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 101; Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 265; Journ. Roy. Micr. Soc., 1916, p. 48.

Description.—Test slightly compressed, generally rounded, initial end broadly rounded, apertural end slightly produced; chambers comparatively few, inflated; sutures distinct and somewhat depressed; wall smooth; aperture radiate.

Length up to 0.90 mm.

Distribution.—There are numerous records for this species from the eastern Atlantic, and Flint has recorded it off the coast of Georgia. I have had specimens from three *Albatross* stations which may be referred to this species. They are from off the coasts of Georgia and Florida.

Polymorphina communis—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
17702	U.S.N.M.	5	D2112....	35 20 50 N.; 75 18 00 W..	16	73.5	s., bk., sp..	Few.
17703	U.S.N.M.	1	D2415....	30 44 00 N.; 79 26 00 W..	440	45.6	Co., crs. s., sh.	Rare.
17704	U.S.N.M.	1	D2639....	25 04 50 N.; 80 15 10 W..	56	....	co. s........	Rare.

POLYMORPHINA CYLINDROIDES Roemer.

Plate 39, fig. 10.

Polymorphina cylindroides Roemer, Neues Jahrbuch, 1838, p. 385, pl. 3, fig. 26.—H. B. Brady, Parker, and Jones, Trans. Linn. Soc. London, vol. 27, 1870, p. 221, pl. 39, figs. 6 *a–c*.—H. B. Brady, Journ. Roy. Micr. Soc.. 1887, p. 914.—Heron-Allen and Earland, Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 265, pl. 42, figs. 15, 16.

The only records for this species in the Atlantic are those given by Brady and Heron-Allen and Earland, off the coasts of the British Isles.

POLYMORPHINA AMYGDALOIDES Reuss.

Globulina amygdaloides Reuss, Zeitschr. deutsch geol. Gesell., vol. 3, 1851, p. 82, pl. 6, fig. 47.

Polymorphina amygdaloides Reuss, Sitz. kais. Akad. Wiss. Wien, vol. 18, 1855, p. 250, pl. 8, fig. 84.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 560, pl. 71, fig. 13.—Sidebottom, Mem. Proc. Manchester Lit. Philos. Soc., vol. 51, No. 9, 1907, p. 9, pl. 2, figs. 12–14;

vol. 54. No. 16, 1910, p. 22.—HERON-ALLEN and EARLAND, Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 263; Journ. Roy. Micr. Soc., 1916, p. 48.—SIDEBOTTOM, Journ. Roy. Micr. Soc., 1918, p. 143.

Polymorphina lactea (WALKER and JACOB), var. *amygdaloides* H. B. BRADY, PARKER, and JONES, Trans. Linn. Soc. London, vol. 27, 1870, p. 214, woodcuts.

There are numerous records for this species, especially in the eastern Atlantic, but in the *Albatross* collections I have had no material which I can refer to this species.

POLYMORPHINA ANGUSTA Egger.

Polymorphina angusta EGGER, Neues Jahrbuch für. Min., 1857, p. 290, pl. 13, figs. 13–15.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 563, pl. 72, figs. 1–3.—WOODWARD, The Observer, vol. 4, 1893, p. 144.—HERON-ALLEN and EARLAND, Journ. Roy. Micr. Soc., 1909, p. 432.

The only record for this species from the western Atlantic is that given by Woodward from Mnemsha Bight, Marthas Vineyard. This, from a study of my own collection, is probably *Polymorphina lactea* (Walker and Jacob), var. *novangliae* Cushman.

Heron-Allen and Earland record a single specimen, apparently recent, from shore sands of Selsey Bill, Sussex. There are numerous other records from Australia and the Indo-Pacific.

POLYMORPHINA EQUALIS D'Orbigny.

Plate 40, fig. 3.

Polymorphina equalis D'ORBIGNY, Ann. Sci. Nat., vol. 7, 1826, p. 265, No. 13.—HERON-ALLEN and EARLAND, Journ. Roy. Micr. Soc., 1916, p. 48.

Globulina aequalis D'ORBIGNY, Foram. Foss. Vienne, 1846, p. 227, pl. 13, figs. 11, 12.

Polymorphina gibba D'ORBIGNY, var. *aequalis* H. B. BRADY, PARKER, and JONES, Trans. Linn. Soc. London, vol. 27, 1870, p. 216, pl. 39, figs. 2*c*, *d*.

Description.—Test much compressed, generally rounded in outline, about as broad as long; chambers few, very slightly inflated; sutures distinct, very slightly depressed; wall smooth; aperture very slightly produced, radiate.

Length up to 0.50 mm.

Distribution.—I have placed under this species two specimens of a flattened form which is somewhat similar to the figure given by D'Orbigny in 1846. They are from two stations, one in the Gulf of Mexico, the other off the coast of South America. The figured specimen (plate 40, fig. 3) shows a fistulose form from the Gulf of Mexico. There are numerous other records for the species, as the above references show.

Polymorphina equalis—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance
				° ′ ″ ° ′ ″		°F.		
17705	U.S.N.M.	1	D2396....	28 36 15 N.; 86 50 00 W..	347	44.1	gy. m.......	Rare.
17706	U.S.N.M.	1	D2756....	3 22 00 S.; 37 49 00 W..	417	40.5	gy. s. sp.....	Rare.

POLYMORPHINA FUSIFORMIS Roemer.

Balkwill and Wright[75] record this species as very rare off Dublin and Wicklow, and again as more rare, off Dublin.

These are the only records for this species in the Atlantic.

POLYMORPHINA GIBBA D'Orbigny.

Polymorphina (*Globulina*) *gibba* D'Orbigny, Ann. Sci. Nat., vol. 7, 1826, p. 266, No. 20; Modèle, No. 63.

Polymorphina gibba H. B. Brady, Parker, and Jones, Trans. Linn. Soc. London, vol. 27, 1870, p. 216, pl. 39, figs. 2 *a–d*.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 561, pl. 71, figs. 12 *a*, *b*; pl. 73, fig. 16.—Balkwill and Wright, Proc. Roy. Irish Acad., ser. 2, vol. 3, 1882, p. 549; Trans. Roy. Irish Acad., vol. 28, 1885, p. 345.—H. B. Brady, Journ. Roy. Micr. Soc., 1887, p. 912.—Wright, Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 486.—Robertson, Proc. Nat. Hist. Soc. Glasgow, pt. 3, 1892, p. 241.—Wright, Irish Nat., vol. 11, 1902, p. 213.—Heron-Allen and Earland, Journ. Roy. Micr. Soc., 1909, p. 431.—Balkwill and Millett, Rec. Foram. Galway, 1908, p. 6.—Heron-Allen and Earland, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 100.—Pearcey, Trans. Roy. Soc. Edinb., vol. 49, 1914, p. 1023.—Heron-Allen and Earland, Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 265; Journ. Roy. Micr. Soc., 1916, p. 48.

There are numerous records for the Atlantic as the above list of reference shows. I have, however, not found typical material in the western Atlantic.

POLYMORPHINA LANCEOLATA Reuss.

Plate 40, figs. 4, 5.

Polymorphina lanceolata Reuss, Zeitschr. deutsch geol. Gesell., vol. 3, 1851, p. 83, pl. 6, fig. 50.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 564, pl. 72, figs. 5, 6; Journ. Roy. Micr. Soc., 1887, p. 913.—Wright, Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 486; Irish Nat., vol. 9, No. 3, 1900, p. 55.—Earland, Journ. Quekett Micr. Club, ser. 2, vol. 9, No. 57, 1905, p. 217.—Balkwill and Millett, Rec. Foram. Galway, 1908, p. 6.—Heron-Allen and Earland, Journ. Roy. Micr. Soc., 1907, p. 432.

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[75] Proc. Roy. Irish Acad., ser. 2, vol. 3, 1882, p. 549; Trans. Roy. Irish Acad., vol 28, 1885, p. 346.

Description.—Test elongate, fusiform, the initial end subacute, apertural end tapering; chambers comparatively few, somewhat inflated; sutures distinct and slightly compressed; wall smooth; aperture radiate.

Length up to 1 mm.

Distribution.—This species has occurred at several stations in the western Atlantic. It is recorded also from the eastern Atlantic. Whether the two lots of material are really the same species or not is questionable.

Polymorphina lanceolata—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
17707	U.S.N.M.	2	D2174....	38 15 00 N.; 72 03 00 W..	1,594	....	gy. m.......	Rare.
17708	U.S.N.M.	1	D2677....	32 39 00 N.; 76 50 30 W..	478	39.3	gn. m.......	Rare.
17709	U.S.N.M.	1	D2678....	32 40 00 N.; 76 40 30 W..	731	38.7	lt. gy. oz....	Rare.
17710	U.S.N.M.	1	D2689....	39 42 00 N.; 71 15 30 W..	525	....	gn. m.......	Rare.
17711	U.S.N.M.	1	D2751....	16 54 00 N.; 63 12 00 W..	687	40.0	bu. glob. oz..	Rare.

POLYMORPHINA OVATA D'Orbigny.

Plate 40, figs. 11, 12.

Polymorphina ovata D'ORBIGNY, Foram, Foss. Vienne, 1846, p 233, pl. 13, figs. 1–3.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 564, pl. 72, figs. 7, 8.—PEARCEY, Trans. Glasgow Nat. Hist. Soc., vol. 2, 1890, p. 1[illegible]8.—Goës, Bull. Mus. Comp. Zoöl., vol. 29, 1896, p. 54.

Under this specific name Brady records specimens from a single *Challenger* station off Culebra Island, West Indies, 390 fathoms (713 meters). I have had it in West Indian material which seems identical with this. It has been recorded from the eastern Atlantic, as the above records will show.

POLYMORPHINA OBLONGA D'Orbigny.

Polymorphina oblonga D'ORBIGNY, Foram. Foss. Vienne, 1846, p. 232, pl. 12, figs. 29–31.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 569, pl. 73, figs. 2, 4.—FLINT, Rep. U. S. Nat. Mus., 1897 (1899), p. 319, pl. 67, fig. 5 [?].

Flint records this species from off the southeastern coast of the United States, but most of the material from this same station belongs to *Polymorphina flintii* Cushman. There are many records from Eastern Europe referred to *P. oblonga*, Williamson's form, which he described as *P. lactea*, var. *oblonga*, and which by several authors has been placed as a valid species.

It is obvious that with D'Orbigny's earlier name Williamson's variety can not be used in a specific sense.

POLYMORPHINA PROBLEMA D'Orbigny.

Guttulina problema D'Orbigny, Ann. Sci. Nat., vol. 7, 1826, p. 266, No. 14; Foram. Foss. Vienne, 1846, p. 224, pl. 12, figs. 26–28.

Polymorphina problema D'Orbigny, Modèle, 1826, No. 61.—H. B. Brady, Parker, and Jones, Trans. Linn. Soc., vol. 27, 1870, p. 225, pl. 39, figs. 11*a*, *b*.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 568, pl. 72, fig. 20; pl. 73, fig. 1; Journ. Roy. Micr. Soc., 1887, p. 913.—Heron-Allen and Earland, Journ. Roy. Micr. Soc., 1916, p. 49.

This name seems to be one commonly used for almost any form of smooth *Polymorphina* that has the chambers much inflated and projecting out from the general surface. Such forms are recorded from many parts of the world, but do not seem to be present at least in the form figured by D'Orbigny from the western part of the Atlantic.

POLYMORPHINA ROTUNDATA (Bornemann).

Guttulina rotundata Bornemann, Zeitschr. deutsch geol. Gesell., vol. 7, 1855, p. 346, pl. 18, fig. 3.

Polymorphina rotundata H. B. Brady, Parker, and Jones, Trans. Linn. Soc. London, vol. 27, 1870, p. 234, pl. 40, figs. 19 *a–e;* text figures *k*, *l*, *m*.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 570, pl. 73, figs. 5–8.—Balkwill and Wright, Trans. Roy. Irish Acad., vol. 28, 1885, p. 346.—H. B. Brady, Journ. Roy. Micr. Soc., 1887, p. 914.—Wright, Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 487; Irish Nat., vol. 9, No. 3, 1900, p. 55; vol. 11, 1902, p. 213.—Earland, Journ. Quekett Micr. Club, ser. 2, vol. 9, No. 57, 1905, p. 217.—Cushman, Proc. Boston Soc. Nat. Hist. Soc., vol. 34, No. 2, 1908, p. 29.—Heron-Allen and Earland, Journ. Roy. Micr. Soc., 1907, p. 434; Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 101; Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 264; Journ. Roy. Micr. Soc., 1916, p. 49.

Rounded forms, such as are commonly referred to this species, seem to be common on the coasts of the British Isles but are rare on this side of the Atlantic. I have had specimens from the Woods Hole region.

POLYMORPHINA SORORIA Reuss.

Plate 41, figs. 3–5.

Polymorphina (*Guttulina*) *sororia* Reuss, Bull. Acad. Roy. Belg., ser. 2, vol. 15, 1862, p. 121, pl. 2, figs. 25–29.

Polymorphina sororia H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 562, pl. 71, figs. 15, 16; pl. 73, fig. 15; Journ. Roy. Micr. Soc., 1887, p. 914.—Pearcey, Trans. Glasgow Nat. Hist. Soc., vol. 2, 1890, p. 178.—Egger, Abh. kön. bay. Akad. Wiss. München, Cl. II, vol. 18, 1893, p. 308, pl. 9, fig. 20.—Wright, Irish Nat., vol. 9, No. 3, 1900, p. 55.—Heron-Allen and Earland, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 102; Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 364; Journ. Roy. Micr. Soc., 1916, p. 48.

Description.—Test somewhat longer than broad, not compressed, initial end subacute, somewhat broadly angled, apertural end slightly extended, somewhat truncate; chambers few; sutures distinct but not depressed; wall smooth; aperture large, radiate.

Length up to 0.75 mm.

Distribution.—I have had the species or what seems to be it from several stations off the northeastern coast of the United States. It is also recorded from various other parts of the world, and especially from the coasts of the British Isles.

Fistulose forms have occurred at two of the stations.

Polymorphina sororia—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°*F.*		
17717	U.S.N.M.	3	D2035....	39 26 16 N.; 70 02 37 W..	1,362	....	glob. oz.....	Few.
17718	U.S.N.M.	2	D2038....	38 30 30 N.; 69 08 25 W..	2,033	....	glob. oz.....	Rare.
17719	U.S.N.M.	1	D2042....	39 33 00 N.; 68 26 45 W..	1,555	38.5	glob. oz.....	Rare.
17720	U.S.N.M.	1	D2097....	37 56 20 N.; 70 57 30 W..	1,917	....	glob. oz.....	Rare.
17721	U.S.N.M.	6	D2713....	38 20 00 N.; 70 08 30 W..	1,859	....	br. oz.......	Frequent.
17722	U.S.N.M.	1	D2714....	38 22 00 N.; 70 17 30 W..	1,825	....	br. oz.......	Rare.

POLYMORPHINA SORORIA Reuss, var. CUSPIDATA H. B. Brady.

Plate 41, fig. 2.

Polymorphina sororia Reuss, var. *cuspidata* H. B. Brady. Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 563, pl. 71, figs. 17–19; pl. 72, fig. 4.

Description.—Variety differing from the typical in the development of a long acicular spine at the base of the test.

Distribution.—I have a single specimen from the Caribbean which is very close to one of the specimens figured by Brady. His records for the species include two from the North Atlantic, west of Ireland in 808 and 1,443 fathoms (1,477 and 2,639 meters).

Polymorphina sororia, var. cuspidata—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°*F.*		
17723	U.S.N.M.	1	D2150....	13 34 45 N.; 81 21 10 W..	382	45.8	wh. crs. s...	Rare.

POLYMORPHINA COMPLANATA D'Orbigny.

Polymorphina complanata D'Orbigny, Foram. Foss. Vienne, 1846, p. 234, pl. 13, figs. 25–30.—H. B. Brady, Parker, and Jones, Trans. Linn. Soc. London, vol. 27, 1870, p. 230, pl. 40, figs. 14*a*, *b*; also text figures.—Balkwill and Millett, Journ. Micr., vol. 3, 1884, p. 84, pl. 4, fig. 9.—H. B. Brady, Journ. Roy. Micr. Soc., 1887, p. 914.—Balkwill and Millett, Rec. Foram. Galway, 1908, p. 6, pl. 4, fig. 9.—Heron-Allen and Earland, Journ. Roy. Micr. Soc., 1909, p. 432, pl. 17, figs. 3–5.

The above references give the only ones of this species for the Atlantic from comparatively shallow water about the British Isles.

POLYMORPHINA THOUINI D'Orbigny.

Under this name Brady[76] records specimens from the Estuary of the Dee, based evidently on Siddall's specimens.

POLYMORPHINA COMPRESSA D'Orbigny.

Polymorphina compressa D'ORBIGNY, Foram. Foss. Vienne, 1846, p. 234, pl. 13. figs. 25–30.—H. B. BRADY, PARKER, and JONES, Trans. Linn. Soc. London, vol. 27, 1870, p. 227, pl. 40, figs. 12 *a–f*.—BALKWILL and WRIGHT, Proc. Roy. Irish Acad., ser. 2, vol. 3, 1882, p. 549.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 565, pl. 72, figs. 9–11.—BALKWILL and WRIGHT, Trans. Roy. Irish Acad., vol. 28, 1885, p. 346.—H. B. BRADY, Journ. Roy. Micr. Soc., 1887, p. 914.—WRIGHT, Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 487.—ROBERTSON, Proc. Nat. Hist. Soc. Glasgow, pt. 3, 1892, p. 241.—WOODWARD, The Observer, vol. 4, 1893, p. 144.—EGGER, Abh. kön. bay. Akad. Wiss. München, Cl. II, vol. 18, 1893, p. 309, pl. 9, figs. 11–13.—MORTON, Proc. Portland Soc., vol. 2, 1897, p. 119.—WRIGHT, Irish Nat., vol. 9, No. 3, 1900, p. 55.—WHITEAVES, Geol. Survey Canada, 1901, p. 10.—WRIGHT, Irish Nat., vol. 11, 1902, p. 213.—EARLAND, Journ. Quekett Micr. Club, ser. 2, vol. 9, No. 57, 1905, p. 217.—BALKWILL and MILLETT, Rec. Foram. Galway, 1908, p. 6.—HERON-ALLEN and EARLAND, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 101; Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 265; Journ. Roy. Micr. Soc., 1916, p. 49.

I have found no typical *Polymorphina compressa* in the collections from the Western Atlantic. As the above list of references will show, however, the species has been recorded many times from the Eastern Atlantic, especially in the region of the British Isles. A reference to the few figures, however, will show what a diversity of form specimens referred to this species have.

POLYMORPHINA CONCAVA Williamson.

Plate 40, fig. 9.

Polymorphina lactea (WALKER and JACOB), var. *concava* WILLIAMSON, Rec. Foram. Great Britain, 1858, p. 72, pl. 6, figs. 151, 152.—SIDEBOTTOM, Mem. Proc. Manchester Lit. Philos. Soc., vol. 51, No. 9, 1907, p. 14, pl. 3, fig. 89; vol. 54, No. 16, 1910, p. 22.

Polymorphina concava H. B. BRADY, PARKER, and JONES, Trans. Linn. Soc. London, vol. 27, 1870, p. 236, pl. 40, figs. 22 *a*, *b*.—BALKWILL and WRIGHT, Proc. Roy. Irish Acad., ser. 2, vol. 3, 1882, p. 549; Trans. Roy. Irish Acad., vol. 28, 1885, p. 346.—H. B. BRADY, Journ. Roy. Micr. Soc., 1887, p. 914.—WRIGHT, Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 487.—EARLAND, Journ. Quekett Micr. Club, ser. 2, vol. 9, No. 57, 1905, p. 217.—CUSHMAN, Proc. Boston Soc. Nat. Hist., vol. 34, No. 2, 1908, p. 28.—HERON-ALLEN and EARLAND, Journ. Roy. Micr. Soc., 1907, p. 431; Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 102; Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 264; Journ. Roy. Micr. Soc., 1916, p. 48.

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[76] Journ. Roy. Micr. Soc., 1887, p. 913.

Description.—Test compressed, of few chambers, one side convex, the other nearly flat and expanded, apparently forming the attachment to the surface of some foreign body; surface smooth; sutures distinct, but very slightly if at all depressed; aperture radiate.

Diameter of the main portion usually not more than 0.60 mm.

Distribution.—This species was originally described from the coast of the British Isles by Williamson. Most of the records for it are from the same general region and in the Mediterranean. I have had what seems to be the same species from the Woods Hole region.

POLYMORPHINA FLINTII, new species.

Plate 40, fig. 10.

Polymorphina compressa FLINT (not D'Orbigny), Rep. U. S. Nat. Mus., 1897 (1899), p. 319, pl. 67, fig. 3.

Description.—Test oval or somewhat rhomboid, compressed; chambers arranged in an irregular biserial manner, four or five chambers on each side in the adult, chambers somewhat inflated; sutures distinct, but very slightly depressed; wall smooth and polished, thick; aperture terminal, radiate.

Length up to 2.30 mm.

Distribution.—Type-specimen (U.S.N.M. Cat. No. 17691) from *Albatross* station D2415, in 440 fathoms (805 meters), off the coast of Georgia. Flint recorded this species as *P. compressa* from several stations off the southeastern coast of the United States, from Cape Hatteras southward. I have had specimens from *Albatross* stations from the region southward from Nantucket to the Florida coast. Brady records *P. compressa* from two stations in this general faunal area, one off Bermuda, and the other off the West Indies, which may probably belong here. So far as the material shows, this species has not occurred in either the Caribbean or the Gulf of Mexico.

It is a large, well-characterized species in its more or less compressed form, somewhat alternating chambers, and thickened test.

Polymorphina flintii—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
17692	U.S.N.M.	4	D2312......	32 54 00 N.; 77 53 30 W..	88	57.8	crs.s., bk.sp.	Few.
17693	U.S.N.M.	1	D2314......	32 43 00 N.; 77 51 00 W..	159	47.4	crs.s., bk.sp.	Rare.
17691	U.S.N.M.	1	D2415......	30 44 00 N.; 79 26 00 W..	440	45.6	co., crs. s....	Rare.
17694	U.S.N.M.	2	....	....	....	....	....	
17695	U.S.N.M.	1	D2416......	31 26 00 N.; 79 07 00 W..	276	53.8	co., brk. sh..	Rare.
17696	U.S.N.M.	1	D2552......	39 47 07 N.; 70 35 00 W..	721	39.6	gy. oz.......	Rare.
17697	U.S.N.M.	1	D2639......	25 04 50 N.; 80 15 10 W..	56	....	co. s.........	Rare.
17698	U.S.N.M.	1	*Fish Hawk* 1038.	....	....	....	....	

POLYMORPHINA EXTENSA, new name.

Plate 41, figs. 7, 8.

Polymorphina longicollis H. B. Brady (not Karrer), Quart. Journ. Micr. Sci., vol. 21, 1881, p. 64; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 572, pl. 73, figs. 18, 19.—Egger, Abh. kön. bay. Akad. Wiss. München, Cl. II, vol. 18, 1893, p. 310, pl. 9, fig. 21 [?]—Chapman, Journ. Linn. Soc. Zool., vol. 30, 1910, p. 414.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 90, pl. 41, figs. 1–3.

Description.—Test elongate, fusiform, outline not lobulate, initial end more or less pointed, apertural end produced into an elongate cylindrical neck; chambers few, slightly inflated; sutures fairly distinct, but not depressed, except in the case of the last-formed one; wall more or less hispid, last chamber especially more inflated and more spinose.

Length up to 0.60 mm.

Distribution.—Brady records this species from three stations in the North Atlantic, 1,125, 1,476, and 2,435 fathoms (2,057, 2,699, and 4,454 meters), and "the best examples of the species" occurring in the South Atlantic at *Challenger* station 338, in 1,990 fathoms (3,640 meters). Therefore it seems probable that his figured specimens came from that station. He also gives four stations in the South Pacific, 1,375, 1,825, 2,075, and 2,425 fathoms (2,515, 3,338, 3,795, and 4,436 meters). Egger recorded a specimen from off Mauritius in 411 meters (225 fathoms). His figure is poor, and it may not be the same. Chapman records it from off Funafuti, 2,195–2,715 fathoms (4,010–4,965 meters). I had material from the North Pacific which I referred to this species, from off the Hawaiian Islands, in 1,670 fathoms (3,054 meters), and between Guam and Japan, in 1884 and 2,167 fathoms (3,446 and 3,963 meters). All the records for this species therefore are in deep water. The two *Albatross* stations in the Atlantic at which I have had specimens of this species, are in 1,362 and 1,395 fathoms (2,491 and 2,552 meters), agreeing with the previous findings in their general depths. These are off the northeastern coast of the United States.

Polymorphina extensa—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°*F.*		
17699	U.S.N.M.	1	D2035....	39 26 16 N.; 70 02 37 W..	1,362	....	glob. oz.....	Rare.
17700	U.S.N.M.	1	D2105....	37 50 00 N., 73 03 50 W..	1,395	41.0	glob. oz.....	Rare.

POLYMORPHINA SPINOSA (D'Orbigny).

Plate 41, figs. 1, 13.

Globulina spinosa D'ORBIGNY, Foram. Foss. Vienne, 1846, p. 230, pl. 13, figs. 23, 24.

Polymorphina (*Globulina*) *spinosa* EGGER, Neues Jahrbuch für Min., 1857, p. 292, pl. 14, figs. 9, 10.—H. B. BRADY, PARKER, and JONES, Trans. Linn. Soc. London, vol. 27, 1870, p. 243, pl. 42, figs. 36*a*, *b*.

Polymorphina spinosa BALKWILL and WRIGHT, Trans. Roy. Irish Acad., vol. 28, 1885, p. 347, pl. 12, fig. 27.—H. B. BRADY, Journ. Roy. Micr. Soc., 1887, p. 915.—HERON-ALLEN and EARLAND, Journ. Roy. Micr. Soc., 1909, p. 435, pl. 17, fig. 9.

The only recent records for the Atlantic seem to be from off the coasts of the British Isles.

POLYMORPHINA RUGOSA D'Orbigny.

Plate 41, fig. 6.

Polymorphina rugosa D'ORBIGNY, in De la Sagra, Hist. Fis. Pol. Nat. Cuba, "Foraminifères," 1839, p. 138, pl. 2, figs. 14, 15.—H. B. BRADY, PARKER, and JONES, Trans. Linn. Soc. London, vol. 27, 1870, p. 237, pl. 40, figs. 23 *a–d*.

Description.—Test slightly compressed, rounded, the apertural end slightly tapering, making the entire test a little longer than broad; chambers few; sutures rather indistinct; surface ornamented by numerous subspinose projections; aperture radiate.

Length up to 0.60 mm.

Distribution.—I have had specimens from two *Albatross* stations, one off the coast of Georgia, the other off the northeastern coast of the United States, about the latitude of New York. D'Orbigny originally described this species from shore sands of Cuba.

Polymorphina rugosa—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
17712	U.S.N.M.	1	D2112....	35 20 50 N.; 75 18 00 W..	16	73.5	s., bk. sp...	Rare.
17713	U.S.N.M.	1	D2262....	39 54 45 N.; 69 29 45 W..	250	41.6	gn. m., s....	Rare.

POLYMORPHINA PULCHELLA (D'Orbigny).

Plate 40, fig. 6.

Guttulina pulchella D'ORBIGNY, in De la Sagra, Hist. Fis. Pol. Nat. Cuba, 1839, "Foraminifères," p. 129, pl. 2, figs. 4–6.

Polymorphina pulchella H. B. BRADY, PARKER, and JONES, Trans. Linn. Soc. London, vol. 27, 1870, p. 239, pl. 41, figs. 28*a*, *b*.—CUSHMAN, Publ. 311, Carnegie Inst. Washington, 1922, p. 33, pl. 4, figs. 7, 8.

Description.—Test elongate, fusiform, somewhat compressed, both ends acute; chambers few; sutures distinct, slightly depressed; wall translucent, with numerous longitudinal costae; aperture slightly extended, radiate.

Length up to 0.75 mm.

Distribution.—D'Orbigny originally described and figured this species from the West Indies region recording it from the shore sands of Cuba and Martinique. The only other records for it are very typical specimens which I obtained at numerous stations in the Tortugas region of the Gulf of Mexico.

It is a very beautiful species, with a clear shell wall ornamented with very delicate longitudinal costae, and apparently has a fairly wide distribution in the West Indian region.

Polymorphina pulchella—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
17701	U.S.N.M.	1	D2420....	37 03 20 N.; 74 31 40 W..	104	47.7	bk. s., m....	Rare.

POLYMORPHINA HIRSUTA H. B. Brady, Parker, and Jones.

Polymorphina hirsuta H. B. BRADY, PARKER, and JONES, Trans. Linn. Soc. London, vol. 27, 1870, p. 243, pl. 42, fig. 37.—HERON-ALLEN and EARLAND, Journ. Roy. Micr. Soc., 1909, p. 435, pl. 17, fig. 1.

Brady, Parker, and Jones record this species from a single specimen from the West Indies. Other records for it seem to be as a fossil.

POLYMORPHINA MYRISTIFORMIS Williamson.

Plate 41, figs. 9–12.

Polymorphina myristiformis WILLIAMSON, Rec. Foram. Great Britain, 1858, p. 73, pl. 6, figs. 156, 157.—H. B. BRADY, Trans. Linn. Soc., vol. 24, 1864, p. 473.—ALCOCK, Proc. Lit. Philos. Soc. Manchester, vol. 4, 1865, p. 206.—H. B. BRADY, PARKER, and JONES, Trans. Linn. Soc. London, vol. 27, 1870, p. 240, pl. 41, figs. 30 *a–c*.—FISCHER, Actes Soc. Linn. Bordeaux, vol. 27, 1870, p. 391, No. 26.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 571, pl. 73, figs. 9, 10.—BALKWILL and WRIGHT, Trans. Roy. Irish Acad., vol. 28, 1885, p. 346.—H. B. BRADY, Journ. Roy. Micr. Soc., 1887, p. 914.—WRIGHT, Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 487.—ROBERTSON, Trans. Nat. Hist. Soc. Glasgow, vol. 3, pt. 3, 1892, p. 241.—WRIGHT, Irish Nat., vol. 9, 1900, p. 55.—HERON-ALLEN and EARLAND, Journ. Roy. Micr. Soc., 1907, p. 434.—SIDEBOTTOM, Mem. Proc. Manchester Lit. Philos. Soc., vol. 51, No. 9, 1907, p. 13, pl. 3, fig. 7.—BALKWILL and MILLETT, Rec. Foram. Galway, 1908, p. 6, pl. 4, fig. 10.—HERON-ALLEN and EARLAND, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 103, pl. 8, figs. 18, 19; Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 265; Journ. Roy. Micr. Soc., 1916, p. 48.

Description.—Test subglobular; chambers indistinct; sutures indistinct, not depressed, surface ornamented with longitudinal costae, frequently broken into short sections; apertural end with a slightly projecting ring about the aperture.

Length up to about 0.50 mm.

Distribution.—The species is common about the southern portion of the British Isles and more rare in the northern portion. Goës does not record it from the Scandinavian region, and it has not occurred in the western Atlantic collections I have examined. The only records outside the British Isles seem to be that of Sidebottom who had specimens referable to this species from off the Island of Delos in the Mediterranean, and of Williamson, who quotes "Tenedos (Levant)."

The distribution of a striking species of this sort seems to show that the fauna of the southern coast at least of the British Isles is related to the Mediterranean, rather than to the western Atlantic.

I have had excellent material from Europe and if its distribution included the western Atlantic, it would have surely been seen in the *Albatross* collections.

Polymorphina myristiformis—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
......	J.A.C....	2	....	Off Plymouth, England..	....	°F.	....	Rare.

POLYMORPHINA ELEGANTISSIMA Parker and Jones.

The only recent Atlantic records for this species are those given by Egger from western Africa and off the Cape Verde Islands. It is a species common in shallow water of the Indo-Pacific and has not occurred so far as I have seen where it might be most probably looked for, that is, in the tropical portion of the western Atlantic. It occurs as a fossil in the Tertiary of the Coastal Plain of the United States, and, according to Heron-Allen and Earland, fossil in England.

POLYMORPHINA REGINA H. B. Brady, Parker, and Jones.

Polymorphina regina H. B. Brady, Parker, and Jones, Trans. Linn. Soc. London, vol. 27, 1870, p. 241, pl. 41, figs. 32*a*, *b*.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 571, pl. 73, figs. 11–13.—Egger, Abh. kön. bay. Akad. Wiss. München, Cl. II, vol. 18, 1893, p. 310, pl. 9, figs. 45, 50, 51.—Millett, Journ. Roy. Micr. Soc., 1903, p. 265.—Earland, Journ. Quekett Micr. Club, ser. 2, vol. 9, 1905, p. 217.—Dakin, Rep. Ceylon Pearl Oyster Fish., vol. 5, 1906, p. 236.—Chapman, Journ.

Quekett Micr. Club, 1907, p. 132, pl. 10, fig. 4.—BAGG, Proc. U. S. Nat. Mus., vol. 34, 1908, p. 139.—HERON-ALLEN and EARLAND, Journ. Roy. Micr. Soc., 1909, p. 435.—CHAPMAN, Proc. Roy. Soc. Victoria, vol. 22, 1910, p. 281.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 91, pl. 41, figs. 6, 7.—HERON-ALLEN and EARLAND, Trans. Zool. Soc. London, vol. 20, 1915, p. 673.—SIDEBOTTOM, Journ. Roy. Micr. Soc., 1918, p. 143.—CUSHMAN, Bull. 676, U. S. Geol. Survey, 1918, p. 54; Proc. U. S. Nat. Mus., vol. 56, 1919, p. 619; Journ. Washington Acad. Sci., vol. 10, No. 7, 1920, p. 199; Publ. 311, Carnegie Inst. Washington, 1922, p. 33, pl. 4, figs. 5, 6.

Description.—Test fusiform; chambers several, inflated, with deep sutures; wall ornamented with elongate, coarse costae, usually not broken on the individual chambers; aperture radiate, produced.

Length not exceeding 0.75 mm.

Distribution.—The only specimens I have had of this species from the Atlantic have been from the Tortugas region. It is recorded by Earland from Bognor, Sussex, England, a single specimen, and by Heron-Allen and Earland from shore sands of Selsey Bill, Sussex, England. Most of the records for the species are from the Indo-Pacific. I have found fossil specimens which seem to belong to this species from the Miocene and Oligocene of the Coastal Plain region of the southeastern United States.

Subfamily 4. UVIGERININAE.

Test composed of several chambers, typically spirally arranged, especially in the earlier portion, later chambers often becoming loosely arranged, or even uniserial; wall smooth or variously ornamented; aperture typically consisting of a neck with a definite phialine lip.

In *Uvigerina* the spirally arranged chambers are typical, old age characters appearing in the loss of ornamentation or in the tendency to become loosely spiral as in *U. interrupta.* In *Siphogenerina* the early chambers are spiral or biserial, especially well-developed in the micospheric form, and the later development is uniserial.

Genus UVIGERINA D'Orbigny, 1826.

Uvigerina D'ORBIGNY (type, *U. pigmea* D'Orbigny), Ann. Sci. Nat., vol. 7, 1826, p. 268.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 573.—CHAPMAN, The Foraminifera, 1902, p. 200.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 91.

Description.—Test elongate, spiral, consisting of numerous chambers, usually arranged triserially, occasionally in later growth with fewer than three chambers in each volution; wall calcareous, perforate, hyaline, smooth or ornamented with spines or costae or modifications of them; aperture with usually a tubular neck at the end of which is a phialine lip.

The genus *Uvigerina* and its related genus *Siphogenerina* form a very distinctive group. The triserial arrangement of the chambers with a tubular aperture and phialine lip will at once distinguish *Uvigerina* from any other of the foraminifera. The ornamentation usually consists either of longitudinal costae which may be more or less interrupted or broken, or of spines. There is often a secondary type of ornamentation developed, as in *U. aculeata* D'Orbigny where the early condition of the test is longitudinally costate, but in the adult a secondary wall is progressively laid down, finally covering the entire test, the surface of which is ornamented by coarse spines. Senescent characters appear most usually as a loss of ornamentation, or in the placing of the chambers at a distance from one another, as in *U. interrupta* H. B. Brady.

Geologically the genus does not seem to occur farther back than the beginning of the Tertiary. From a study of the western Atlantic material and of the fossil collections from the Coastal Plain of the United States, it seems that the number of species of *Uvigerina* is much greater than has been recognized. In the western Atlantic they certainly have a very definite distribution and the characters are very constant. Likewise in the fossil series species seem to be rather limited in their vertical range.

UVIGERINA CANARIENSIS D'Orbigny.

Plate 41, figs. 14–16.

"Testae pineiformes minusculae" SOLDANI, Testaceographia, vol. 2, 1789, p. 18, pl. 4, figs. E, F, G, H.

Uvigerina nodosa, var. β. D'ORBIGNY, Ann. Sci. Nat., vol. 7, 1826, p. 269, No. 3.

Uvigerina canariensis D'ORBIGNY, Foram. Canaries, 1839, p. 138, pl. 1, figs. 25–27.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 573, pl. 74, figs. 1–3; Journ. Roy. Micr. Soc., 1887, p. 915.—GOËS, Kongl. Svensk. Vet. Akad. Handl., vol. 25, No. 9, 1894, p. 52, pl. 9, figs. 489–492.—EGGER, Abh. kön. bay. Akad. Wiss. München, Cl. II, vol. 18, 1893, p. 311, pl. 9, fig. 43.—EARLAND, Journ. Quekett Micr. Club, ser. 2, vol. 9, 1905, p. 218.—HERON-ALLEN and EARLAND, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 103.

Description.—Test elongate, made up of numerous chambers, spirally arranged, three chambers making up each whorl; chambers inflated, rotund, distinctly separated externally by rather deep sutures; wall smooth, occasionally the early chambers showing traces of costae or spines; aperture usually with a tubular neck and broad phialine lip; color grayish-white.

Length 1 mm. or somewhat more.

Distribution.—D'Orbigny originally described this species from the Canaries (shore sand of Teneriffe), and referred to it certain forms he had previously found in the Mediterranean. In the *Challenger* collections Brady records it off Bermuda, 435 fathoms (796 meters), from the South Atlantic, off Buenos Aires, 1,900 fathoms

(3,475 meters), and off the Cape of Good Hope, 150 fathoms (274 meters). He also gives records from the Pacific. It occurs rarely about the British Isles, off Holy Island (Brady); estuary of the Dee (Siddall); southwest of Ireland (Wright); off Bognor, Sussex (Earland); Clare Island region of Ireland (Heron-Allen and Earland). Goës recorded it from off the Azores, and Egger, in the Atlantic, from off the Cape Verde Islands. There are numerous records for its occurrence elsewhere but they are not included here.

On the western side of the Atlantic the only records are those of Brady. I have had no smooth *Uvigerinae* from the *Albatross* collections, nor did Flint.

UVIGERINA AMPULLACEA H. B. Brady.

Plate 42, figs. 5, 6.

Uvigerina asperula Czjzek, var. *ampullacea* H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 579, pl. 75, figs. 10, 11.—Flint, Rep. U. S. Nat. Mus., 1897 (1899), p. 320, pl. 68, fig. 5.

Description.—Test composed of a group of chambers, making a test broadly rounded at the base and with an oval form, compact, followed by one or two chambers somewhat detached from the general mass; sutures slightly depressed; wall finely spinose, the apertural end of the last-formed chamber somewhat drawn out into a tapering neck, with a slightly phialine lip.

Length slightly less than 1 mm.

Distribution.—Brady described this species as a variety of *U. asperula* Czjzek. His records in the *Challenger* report include in the Atlantic a station to the south of Ireland in 725 fathoms (1,326 meters); off Culebra Island, West Indies, 390 fathoms (713 meters), and off the coast of South America in 350–675 fathoms (640–1,234 meters). He also gives stations in the South Pacific 410–620 fathoms (750–1,134 meters). Flint's specimens were from off the coast of Brazil. I have had specimens referable to this species from the Gulf of Mexico, the Caribbean, and off the coast of Brazil.

It is recorded from other parts of the world, especially in the Pacific where it may occur.

Uvigerina ampullacea—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
17678	U.S.N.M.	2	D2117....	15 24 20 N.; 63 31 30 W..	683	39.8	yl. m., fne. s.	Rare.
17679	U.S.N.M.	1	D2144....	9 49 00 N.; 79 31 30 W..	896	....	gn. m.......	Rare.
17680	U.S.N.M.	2	D2393....	28 43 00 N.; 87 14 30 W..	525	41.1	lt. gy. m....	Rare.
17681	U.S.N.M.	1	D2751....	16 54 00 N.; 63 12 00 W..	687	40.0	bu. glob. oz..	Rare.
17682	U.S.N.M.	1	D2756....	3 22 00 S.; 37 49 00 W..	417	40.5	gy. spk......	Rare.
17683	U.S.N.M.	1	H60......	17 39 00 N.; 65 44 00 W..	578	....	co. s. for.....	Rare.

UVIGERINA AUBERIANA D'Orbigny.

Plate 42, figs 3, 4.

Uvigerina auberiana D'ORBIGNY, in De la Sagra, Hist. Fis. Pol. Nat. Cuba, 1839, "Foraminifères," p. 106, pl. 2, figs. 23, 24.

Description.—Test elongate, rapidly tapering from the narrow base to the greatest breadth somewhat above the middle; periphery lobulate; chambers inflated; sutures depressed, distinct; wall ornamented, closely set with fine spinose projections; the last-formed chamber somewhat smoother and of lessened diameter; apertural end tapering, with an elongate neck which is spinose, ending in a phialine lip.

Length up to 1 mm.

Distribution.—D'Orbigny described this species from shore sands of Cuba, Jamaica, and Martinique. Brady records it from south of Rockall Bank in 630 fathoms (1,152 meters). His figure, however, is not like the typical form of the species as developed in the West Indies. I have specimens which may be referred to this species from stations off the coast of the Lesser Antilles.

It is probable that the material from Abrohlos Bank off Brazil, of Brady, Parker, and Jones[77] is this species, the smoother form (fig. 5) possibly var. *laevis* Goës.

Uvigerina auberiana—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
17684	U.S.N.M.	1	D2117....	15 24 20 N.; 63 31 30 W..	683	39.8	yl. m., fne. s.	Rare.
17685	U.S.N.M.	1	D2752....	13 34 00 N.; 61 04 00 W..	281	48.0	bk. s........	Rare.
17686	U.S.N.M.	2	D2754....	11 40 00 N ; 58 33 00 W..	880	38.0	glob. oz.....	Rare.

UVIGERINA AUBERIANA D'Orbigny, var. LAEVIS Goës.

Uvigerina auberiana Goës (not D'Orbigny), Kongl. Svensk. Vet. Akad. Handl., vol. 19, no. 4, 1882, p. 60, pl. 4, figs. 71–74.

Uvigerina auberiana D'ORBIGNY, forma *laevis* Goës, Bull. Mus. Comp. Zoöl., vol. 29, 1896, p. 51.

Description.—Variety differing from the typical in the much smoother surface and often smaller and more slender form.

Distribution.—Goës had this form from the Caribbean, and I have what I think is the same from a few stations in the Gulf of Mexico and off the southeastern coast of the United States.

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[77] Trans. Zool. Soc. London, vol. 12, 1888, pl. 45, fig. 4.

Uvigerina auberiana, var. laevis—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
17687	U.S.N.M.	1	D2399....	28 44 00 N.; 86 18 00 W..	196	51.6	gy. m.......	Rare.
17688	U.S.N.M.	4	D2400....	28 41 00 N.; 86 07 00 W..	169	....	gy. m.......	Few.
17689	U.S.N.M.	3	D2614....	34 09 00 N.; 76 02 00 W..	168	....	gy. s., bk. sp.	Few.
17690	U.S.N.M.	1	D2668....	30 58 30 N.; 79 38 00 W..	294	39.3	gn. m.......	Rare.

UVIGERINA ACULEATA D'Orbigny.

Uvigerina aculeata D'ORBIGNY, Foram. Foss. Bass. Tert. Vienne, 1846, p. 191, pl. 11, figs. 27, 28.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 578, pl. 75, figs. 1, 2.—WRIGHT, Ann. Mag. Nat. Hist., ser. 6, vol. 4, 1889, p. 449; Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 487.

The only Atlantic records referred to this species are as follows: East of Buenos Aires, 1,900 fathoms (3,475 meters) (H. B. Brady); and off the southwest coast of Ireland, 1,000 and 1,020 fathoms (1,829 and 1,866 meters) (Wright).

From the collections I have examined such forms as those figured by Brady have been seen only from the Indo-Pacific. Wright's remark of his specimens that "many of the specimens are intermediate between *U. aculeata* and *U. pygmaea*" would probably indicate that he had the species I have in this paper named *U. peregrina*.

UVIGERINA SEMICOSTATA, new species.

Plate 42, figs. 1, 2.

Description.—Test elongate, tapering, greatest breadth near the apertural end, initial end broadly rounded; chambers numerous, much inflated; sutures distinct and much depressed; wall ornamented in the adult with numerous short, low, rounded costae, beginning near the base of the chamber and extending up part of the way on its surface, the upper part of the chamber smooth and unornamented; aperture circular at the end of a short cylindrical neck with a phialine lip.

Length up to 0.70 mm.

Distribution.—Type-specimens (U.S.N.M. Cat. No. 17642) from *Albatross* station D2160, in 167 fathoms (305 meters), on the southwestern coast of Cuba.

This is distinct from the other species of the western Atlantic in the peculiar ornamentation of the very inflated chambers.

Uvigerina semicostata—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
17642	U.S.N.M.	2	D2160....	23 10 31 N.; 82 20 37 W..	167	....	co...........	Rare.

UVIGERINA FLINTII, new species.

Plate 42, fig. 18.

Uvigerina tenuistriata Flint (not *U. tenuistriata* Reuss), Rep. U. S. Nat. Mus., 1897 (1899), p. 320, pl. 68, fig. 1.

Description.—Test somewhat elongate, not more than twice as long as broad, fusiform or oval; chambers rather obscure; sutures only slightly depressed and partially hidden by the ornamentation of the surface which consists of numerous very fine longitudinal costae only slightly raised above the general surface, the whole test thin and translucent, shining; apertural end slightly depressed, the apertural neck with its base in this hollow, the outer end with a flaring lip, the sides of the neck with two or three ringlike projections.

Length up to 0.65 mm.

Distribution.—Type-specimen (U.S.N.M. Cat. No. 17639) from *Albatross* stations D2641, in 60 fathoms (110 meters), off Carysfort Light, Florida. It also occurred in typical form at other stations about southern Florida, one off the coast of Georgia and one in the Caribbean Sea off Yucatan.

This is a very distinctive species and is evidently limited to the warmer portions of the western Atlantic, unless, as is the case of other species, it may extend westward into the Indo-Pacific.

The whole appearance is distinctive, in the very slightly lobulate outline, the sunken neck, the plates of the outside of the neck, the shining, translucent character of the test, and the fine ornamenttation.

Flint has this species from this same station and referred it to *U. tenuistriata* Reuss. This is probably the species Goës figures and refers to *U. pygmaea*.[78]

Uvigerina flintii—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
17636	U.S.N.M.	3	D2311....	32 55 00 N.; 77 54 00 W..	79	59.1	crs. s., bk. sp.	Few.
17637	U.S.N.M.	2	D2358....	20 19 00 N.; 87 03 30 W..	222	....	fne. wh. co...	Rare.
17638	U.S.N.M.	9	D2639....	25 04 50 N.; 80 15 10 W..	56	....	co. s.........	Common.
17639	U.S.N.M.	1	D2641....	25 11 30 N.; 80 10 00 W..	60	69.2	co. s.........	Frequent.
17640	U.S.N.M.	6	D2641....	....	....	....	....	
17641	U.S.N.M.	2	....	Off Sand Key, Fla.......	72	....	....	Rare.

UVIGERINA PIGMEA D'Orbigny?

There are very numerous records under this name in various parts of the Atlantic, as well as for the rest of the world. A study of D'Orbigny's type figure and Modéle shows that his type was a fusiform test with numerous, rather low, rounded costae, closely conforming to the contour of the chamber, the later chambers roughened but without costae. The types were fossils from the region of Sienna, Italy.

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[78] Kongl. Svensk. Vet. Akad. Handl., vol. 19, no. 4, 1882, p. 59, pl. 4, figs. 68, 69; 70 [?].

Except for the species here named *U. peregrina*, costate Uvigerinae from the Western Atlantic are very rare. I have scattered specimens from a few stations, none of which can be specifically identical with that of D'Orbigny. After reviewing specimens of costate forms from various parts of the present ocean and from the Tertiary, I am convinced that there are several distinct forms with definite distributions that have all been included at various times under this name of D'Orbigny.

UVIGERINA PEREGRINA, new species.

Plate 42, figs. 7–10.

Uvigerina pygmaea FLINT (not *U. pigmea* D'Orbigny), Rep. U. S. Nat. Mus., 1897 (1899), p. 320, pl. 68, fig. 2.

Description.—Test elongate, about 2½ times as long as broad, widest in the middle, ends rounded; chambers fairly numerous, inflated, distinct; sutures depressed but the line of the suture indistinct; wall ornamented with longitudinal costae, about 10 on a full-grown chamber, those of each chamber usually not continuous with those of adjacent chambers, high and very thin and sharp, toward the base and apertural ends of the test becoming broken up into spinose or irregular short portions; the wall between the costae and the costae themselves distinctly granular; aperture circular at the end of a distinct cylindrical neck, often spinose and with a phialine lip.

Length up to 0.85 mm.

Distribution.—Type-specimen (U.S.N.M. Cat. No. 17574) from *Albatross* station D2029, in 1,168 fathoms (2,136 meters), off the northeastern coast of the United States. This is a very common species in the cool waters of moderate depths off the northeastern coast of the United States, and at a very few stations just south of Cape Hatteras. It occurs in great numbers, making up a decidedly important proportion of the bottom material.

It is very different from typical *U. pigmea* D'Orbigny, as a reference to D'Orbigny's figure and model will show. Our species may be distinguished by the high plate-like costae, the very granular surface, even of the costae, spinose or broken plates at the apertural and initial ends, and the often spinose neck. It is represented further southward by the following variety.

Uvigerina peregrina—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
17571	U.S.N.M.	3	D2003....	37 16 30 N.; 74 20 36 W..	641	....	....	Few.
17572	U.S.N.M.	10+	D2018....	37 12 22 N.; 74 20 04 W..	788	39.0	bu. m.......	Abundant.
17573	U.S.N.M.	1	D2022....	37 32 00 N.; 74 13 20 W..	487	40.0	bu. m.......	Rare.
17574	U.S.N.M.	1	D2029....	39 42 00 N.; 70 47 00 W..	1,168	38.5	gy. m.......	Abundant.
17575	U.S.N.M.	10+	D2029....					
17576	U.S.N.M.	2	D2029....					
17577	U.S.N.M.	7	D2034....	39 27 10 N.; 69 56 20 W..	1,346	38.0	glob. oz.....	Frequent.
17578	U.S.N.M.	10+	D2035....	39 26 16 N.; 70 02 37 W..	1,362	....	glob. oz.....	Abundant.
17579	U.S.N.M.	3	D2036....	38 52 40 N.; 69 24 40 W..	1,735	38.0	glob. oz.....	Few.
17580	U.S.N.M.	10+	D2037....	38 53 00 N.; 69 23 30 W..	1,731	38.0	glob. oz.....	Abundant.
17581	U.S.N.M.	1	D2039....	38 19 26 N.; 68 20 20 W..	2,369	....	glob. oz.....	Rare.
17582	U.S.N.M.	10+	D2041....	39 22 50 N.; 68 25 00 W..	1,608	38.0	glob. oz.....	Abundant.
17583	U.S.N.M.	3	D2042....	39 33 00 N.; 68 26 45 W..	1,555	38.5	glob. oz.....	Few.
17584	U.S.N.M.	10+	D2043....	39 49 00 N.; 68 28 30 W..	1,467	38.5	glob. oz.....	Abundant.
17585	U.S.N.M.	3	D2048....	40 02 00 N.; 68 50 30 W..	547	29.0	crs. s., m., g.	Few.
17586	U.S.N.M.	10+	D2050....	39 42 50 N.; 69 21 20 W..	1,050	44.5	glob. oz.....	Abundant.
17587	U.S.N.M.	10+	D2052....	39 40 05 N.; 69 21 25 W..	1,098	45.0	glob. oz.....	Abundant.
17588	U.S.N.M.	10+	D2063....	42 23 00 N.; 66 23 00 W..	141	46.0	s., crs. g.....	Abundant.
17589	U.S.N.M.	6	D2073....	41 54 15 N.; 65 39 00 W..	587	40.0	gy. s........	Frequent.
17590	U.S.N.M.	10+	D2076....	41 13 00 N.; 66 00 50 W..	906	....	bu. m.......	Abundant.
17591	U.S.N.M.	1	D2078....	41 11 30 N.; 66 12 20 W..	499	40.0	gy. m., s....	Rare.
17592	U.S.N.M.	6	D2084....	40 16 50 N.; 67 05 15 W..	1,290	40.0	bu. m., s....	Frequent.
17593	U.S.N.M.	9	D2093....	39 42 50 N.; 71 01 20 W..	1,000	39.0	for., s., m...	Common.
17594	U.S.N.M.	10+	D2105....	37 50 00 N.; 73 03 50 W..	1,395	41.0	glob. oz.....	Abundant.
17595	U.S.N.M.	10+	D2111....	35 09 50 N.; 74 57 40 W..	938	....	gn. m.......	Abundant.
17596	U.S.N.M.	10	D2112....	35 30 50 N.; 75 18 00 W..	16	73.5	s., bk., sp...	Common.
17597	U.S.N.M.	6	D2172....	38 01 15 N.; 73 44 00 W..	568	39.0	gn. m.......	Frequent.
17598	U.S.N.M.	10+	D2184....	40 00 15 N.; 70 55 30 W.	136	48.9	gn. m., s....	Abundant.
17599	U.S.N.M.	10+	D2189....	39 49 30 N.; 70 26 00 W..	600	39.7	gn. m., s....	Abundant.
17600	U.S.N.M.	10+	D2192....	39 46 30 N.; 70 14 45 W..	1,060	38.6	gy. oz.......	Abundant.
17601	U.S.N.M.	2	D2196....	39 35 00 N.; 69 44 00 W..	1,230	38.0	gn. m.......	Rare.
17602	U.S.N.M.	10+	D2202....	39 38 00 N.; 71 39 45 W..	515	39.1	gn. m.......	Abundant.
17603	U.S.N.M.	10+	D2203....	39 34 15 N.; 71 41 15 W..	705	38.9	gn. m., s....	Abundant.
17604	U.S.N.M.	10+	D2204....	39 30 30 N.; 71 44 30 W..	728	39.1	br. m.......	Abundant.
17605	U.S.N.M.	10+	D2205....	39 35 00 N.; 71 18 45 W..	1,073	38.1	gy. oz.......	Abundant.
17606	U.S.N.M.	8	D2212....	39 59 30 N.; 70 30 45 W..	428	40.0	gn. m.......	Frequent.
17607	U.S.N.M.	1	D2219....	39 46 22 N.; 69 29 00 W..	948	38.8	gy. m.......	Rare.
17608	U.S.N.M.	10+	D2231....	38 29 00 N.; 73 09 00 W..	965	36.8	gy. oz.......	Abundant.
17609	U.S.N.M.	2	D2318....	32 53 00 N.; 77 53 00 W..	99	57.2	crs. s., bk. sp.	Rare.
17610	U.S.N.M.	3	D2394....	28 38 30 N.; 87 02 00 W..	420	41.8	gn. m.......	Few.
17611	U.S.N.M.	10+	D2530....	40 53 30 N.; 66 24 00 W..	956	38.4	gy. oz.......	Abundant.
17612	U.S.N.M.	7	D2531....	40 42 00 N.; 66 33 00 W..	852	38.4	gy. m.......	Frequent.
17613	U.S.N.M.	10+	D2534....	40 01 00 N.; 67 29 15 W..	1,234	37.8	gy. oz.......	Abundant.
17614	U.S.N.M.	10+	D2535....	40 03 30 N.; 67 27 15 W..	1,149	37.8	gy. oz.......	Abundant.
17615	U.S.N.M.	3	D2542....	40 00 15 N.; 70 42 20 W..	129	47.2	s., brk. sh . .	Few.
17616	U.S.N.M.	3	D2552....	39 47 07 N.; 70 35 00 W..	721	39.6	gy. oz.......	Few.
17617	U.S.N.M.	10+	D2555....	39 53 00 N.; 71 32 00 W..	136	47.7	gn. m., s....	Abundant.
17618	U.S.N.M.	10+	D2562....	39 15 30 N.; 71 25 00 W..	1,434	37.3	gy. oz.......	Abundant.
17619	U.S.N.M.	8	D2563....	39 18 30 N.; 71 23 30 W..	1,422	37.4	gy. oz.......	Frequent.
17620	U.S.N.M.	10+	D2564....	39 22 00 N.; 71 23 30 W..	1,390	37.3	gy. oz.......	Abundant.
17621	U.S.N.M.	10+	D2581....	39 43 00 N.; 71 34 00 W..	394	....	gn. m.......	Abundant.
17622	U.S.N.M.	10+	D2584....	39 05 30 N.; 72 23 20 W..	641	39.5	gy. m.......	Abundant.
17623	U.S.N.M.	1	D2586....	39 02 40 N.; 72 40 00 W..	328	40.2	dk. gy. m...	Rare.
17624	U.S.N.M.	10+	D2677....	32 39 00 N.; 76 50 00 W..	478	39.3	gn. m.......	Abundant.
17625	U.S.N.M.	10	D2679....	32 40 00 N.; 76 40 00 W..	782	38.6	lt. gy. oz....	Common.
17626	U.S.N.M.	10+	D2680....	39 50 00 N.; 70 26 00 W..	555	....	....	Abundant.
17627	U.S.N.M.	10	D2682....	39 38 00 N.; 70 22 00 W..	990	....	gn. m.......	Common.
17628	U.S.N.M.	10+	D2684....	39 35 00 N.; 70 54 00 W..	1,106	....	br. c., bk. sp.	Abundant.
17629	U.S.N.M.	10+	D2689....	39 42 00 N.; 71 15 30 W..	525	....	gn. m.......	Abundant.
17630	U.S.N.M.	10+	D2705....	42 47 00 N.; 61 04 00 W..	1,255	....	lt. br. oz....	Abundant.
17631	U.S.N.M.	10+	D2706....	41 28 30 N.; 65 35 30 W..	1,188	....	gy. oz., for..	Abundant.
17632	U.S.N.M.	10+	D2710....	40 06 00 N.; 68 01 00 W..	984	....	gn. m.......	Abundant.
17633	U.S.N.M.	10	D2721....	38 56 00 N.; 72 11 30 W..	813	....	gy. oz.......	Common.
17634	U.S.N.M.	4	D2740....	37 40 00 N.; 73 50 00 W..	1,011	38.0	br. oz.......	Few.
17635	U.S.N.M.	10+	D2748....	39 31 00 N.; 71 14 30 W..	1,163	37.8	gy. m., for..	Abundant.

UVIGERINA PEREGRINA, new species, var. BRADYANA, new variety.

Plate 42, fig. 12.

Description.—Variety differing from the typical in the more elongate and slender test, the much lower costae, and the less coarsely punctate test.

Length up to 1 mm. or slightly more.

Distribution.—Type-specimen (U.S.N.M. Cat. No. 17465) from *Albatross* station D2568, in 1781 fathoms (3257 meters), off the northeastern coast of the United States. The same variety has occurred at several other stations in the same region but not elsewhere.

This is distinct from the typical form and might be referred by some authors to *U. tenuistriata*. In the *Challenger* Summary of Results volume, *U. tenuistriata* is recorded from off Bermuda and off the northeastern coast of the United States, and these records may be our variety.

Uvigerina peregrina, var. bradyana—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
17643	U.S.N.M.	6	D2105....	37 50 00 N.; 73 03 50 W..	1,395	41.0	glob. oz.....	Frequent.
17644	U.S.N.M.	10+	D2194....	39 43 45 N.; 70 07 00 W..	1,140	38.4	oz...........	Abundant.
17645	U.S.N.M.	1	D2568....	39 15 00 N.; 68 08 00 W..	1,781	36.9	gy. oz.......	Few.
17646	U.S.N.M.	3	D2568....	....	......	......	....	
17647	U.S.N.M.	4	D2572....	40 29 00 N.; 66 04 00 W..	1,769	37.8	gy. oz.......	Few.
17648	U.S.N.M.	9	D2573....	40 34 18 N.; 66 09 00 W..	1,742	37.3	gy. m., s....	Common.
17649	U.S.N.M.	3	D2585....	39 08 30 N.; 72 17 00 W..	542	39.0	dk. gy. m...	Few.
17650	U.S.N.M.	1	D2586....	39 02 40 N.; 72 40 06 W..	328	40.2	dk. gy. m...	Rare.

UVIGERINA PEREGRINA, new species, var. PARVULA, new variety.

Plate 42, fig. 11.

Description.—Variety differing from the typical in the usually smaller size, the more inflated and remote character of the last chamber, and the shorter stouter form of the whole test.

Distribution.—Type-specimen (U.S.N.M. Cat. No. 17666) from *Albatross* station D2400, in 169 fathoms (309 meters), in the northern part of the Gulf of Mexico. The variety also occurs at several other stations in the same vicinity, near Cuba, off Central America in the Caribbean, and off the southeastern coast of Brazil with one station on the southeastern coast of the United States.

It is possible that the species figured by Brady, Parker, and Jones[79] may belong here. The *Albatross* material from the Brazilian coast is larger than that from the Gulf of Mexico.

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[79] Trans. Zool. Soc., London, vol. 12, 1888, pl. 45, fig. 2.

Uvigerina peregrina, var. parvula—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
17651	U.S.N.M.	10+	D2144....	9 49 00 N.; 79 31 30 W..	896	....	gn. m.......	Abundant.
17652	U.S.N.M.	7	D2150....	13 34 45 N.; 81 21 10 W..	382	45.8	wh. crs. s....	Frequent.
17653	U.S.N.M.	4	D2160....	23 10 31 N.; 82 20 37 W..	167	....	co...........	Few.
17654	U.S.N.M.	10+	D2335....	23 10 39 N.; 82 20 21 W..	204	....	....	Abundant.
17655	U.S.N.M.	1	D2339....	23 10 40 N.; 82 20 15 W..	191	....	co...........	Rare.
17656	U.S.N.M.	10+	D2377....	29 07 30 N.; 88 08 00 W..	210	67.0	gy. m.......	Abundant.
17657	U.S.N.M.	4	D2383....	28 32 00 N.; 88 06 00 W..	1,181	39.6	br. gn. m....	Few.
17658	U.S.N.M.	2	D2385....	28 51 00 N.; 88 18 00 W..	730	40.1	gy. m.......	Rare.
17659	U.S.N.M.	5	D2392....	28 47 30 N.; 87 27 00 W..	724	40.7	br. gn. m....	Few.
17660	U.S.N.M.	6	D2393....	28 43 00 N.; 87 14 30 W..	525	41.1	lt. gy. m....	Frequent.
17661	U.S.N.M.	10+	D2394....	28 38 30 N.; 87 02 00 W..	420	41.8	gn. m.......	Abundant.
17662	U.S.N.M.	10+	D2395....	28 36 15 N.; 86 50 00 W..	347	44.1	gy. m.......	Abundant.
17663	U.S.N.M.	1	D2396....	28 34 00 N.; 86 48 00 W..	335	....	gy. m.......	Rare.
17664	U.S.N.M.	10+	D2398....	28 45 00 N.; 86 26 00 W..	227	48.6	gy. m.......	Abundant.
17665	U.S.N.M.	5	D2399....	28 44 00 N.; 86 18 00 W..	196	51.6	gy. m.......	Few.
17666	U.S.N.M.	2	D2400....	28 41 00 N.; 86 07 00 W..	169	....	gy. m.......	Abundant.
17667	U.S.N.M.	10+	D2400....					
17668	U.S.N.M.	1	D2405....	28 45 00 N.; 85 02 00 W..	30	....	gy. s., brk. sh	Rare.
17669	U.S.N.M.	1	D2678....	32 40 00 N.; 76 40 30 W..	731	38.7	lt. gy. oz....	Rare.
17670	U.S.N.M.	4	D2760....	12 07 00 S.; 37 17 00 W..	1,019	39.5	br. co.......	Few.
17671	U.S.N.M.	3	D2761....	15 39 00 S.; 38 32 54 W..	818	39.0	pter. oz.....	Few.
17672	U.S.N.M.	10+	D2763....	24 17 00 S.; 42 48 30 W..	671	37.9	glob. oz.....	Abundant.

UVIGERINA PORRECTA H. B. Brady.

Uvigerina porrecta H. B. Brady, Quart. Journ. Micr. Sci., vol. 19, 1879, p. 60, pl. 8, figs. 15, 16; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 577, pl. 74, figs. 21–23.—Earland, Journ. Quekett Micr. Club, ser. 2, vol. 9, 1905, p. 218.

One of the *Challenger* stations given for this species is off Bermuda, 435 fathoms (796 meters). The others are in the Pacific. Earland records it as very rare at Bognor, Sussex, England. There seem to be no other Atlantic records. I have failed to find it in the western Atlantic, even in the tropical portion, and it seems that the specimens recorded from the Atlantic should be reexamined to see if they are really the same as the species characteristic of the Indo-Pacific.

UVIGERINA OCCIDENTALIS, new species.

Uvigerina angulosa Cushman, Publ. 311, Carnegie Inst. Washington, 1922, p. 34, pl. 5, figs. 3, 4.

Description.—Test minute, elongate, triangular in transverse section, the periphery somewhat lobulate; chambers distinct, those of the last-formed portion becoming more distinct and remote; sutures distinct and depressed; wall ornamented with comparatively large, high costae on all the chambers except the last ones in the adult, apertural end drawn out into a tubular neck with a slight phialine lip.

Length not exceeding 0.50 mm.

Distribution.—Type-specimen from the Tortugas region. It has also occurred at several *Albatross* stations, ranging from the eastern angle of South America into the Caribbean and Gulf of Mexico, one south of Cape Hatteras, and another south of the latitude of New York.

It is evidently a species with a southern range and occurring in warm waters. It may also be found to extend to the Indo-Pacific where *Uvigerina angulosa* has been recorded. The last-formed chambers in their loose arrangement, the rather coarse costae, the small size and thin hyaline test, will distinguish it from either the typical British *U. angulosa*, or the western Atlantic form of that species. It is probably the same as that I have recorded from the Pleistocene of Panama[80] and from the Pliocene, Waccamaw formation on Waccamaw River, South Carolina.[81] It resembles the Pacific collections I have had from off Hawaii and elsewhere.[82]

Uvigerina occidentalis—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
17673	U.S.N.M.	1	D2150....	13 34 45 N.; 81 21 10 W..	382	45.8	wh. crs. s....	Rare.
17674	U.S.N.M.	1	D2311....	32 55 00 N.; 77 54 00 W..	79	59.1	crs. s., bk. sp	Rare.
17675	U.S.N.M.	3	D2378....	29 14 30 N.; 88 09 30 W..	68	....	gy. m.......	Few.
17676	U.S.N.M.	3	D2684....	39 35 00 N.; 70 54 00 W..	1,106	....	br. c., bk. sp.	Few.
17677	U.S.N.M.	3	D2756....	3 22 00 S.; 37 49 00 W..	417	40.5	gy. spk......	Few.

UVIGERINA ANGULOSA Williamson.

Plate 41, figs. 17–20.

Uvigerina angulosa Williamson, Rec. Foram. Great Britain, 1858, p. 67, pl. 5, fig. 140.—Seguenza, Atti Accad. Lincei, ser. 3, vol. 6, 1879, pp. 226, 307.—Bütschli, in Bronn, Klassen und Ordnungen Thier-Reichs, vol. 1, 1880, p. 200, pl. 7, fig. 31.—Balkwill and Wright, Proc. Roy. Irish Acad., ser. 2, vol. 3, 1882, p. 549.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 576, pl. 74, figs. 15–18.—Balkwill and Wright, Trans. Roy. Irish Acad., vol. 28, 1885, p. 347.—H. B. Brady, Journ. Roy. Micr. Soc., 1887, p. 915.—Wright, Ann. Mag. Nat. Hist., vol. 4, ser. 6, 1889, p. 449.—Pearcey, Trans. Glasgow Nat. Hist. Soc., vol. 2, 1890, p. 178.—Wright, Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 487.—Robertson, Trans. Roy. Hist. Soc. Glasgow, vol. 3, pt. 3, 1892, p. 241.—Egger, Abh. kön. bay. Akad. Wiss. München, Cl. II, vol. 18, 1893, p. 314, pl. 9, figs. 40, 46, 47.—Goës, Kongl. Svensk. Vet. Akad. Handl., vol. 25, No. 9, 1894, p. 51, pl. 9, figs. 502–509.—Schlumberger, Mem. Soc. Zool. France, vol. 7, 1894, p. 253.—Jones, Pal. Soc., 1895, p. 277, pl. 7, fig. 26.—Chapman, Proc. Zool. Soc. London, 1895, p. 35.—Flint, Rep. U. S. Nat. Mus., 1897 (1899), p. 320, pl. 68, fig. 3.—Wright, Irish Nat., vol. 9, No. 3, 1900, p. 55.—Liebus, Neues Jahrb.

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[80] Amer. Geologist, vol. 33, 1904, p. 266.

[81] Bull. 676, U. S. Geological Survey, 1918, p. 10.

[82] Bull. 71, U. S. Nat. Mus., pt. 3, 1913, pl. 4, fig. 4.

für Min., vol. 1, 1901, p. 120, pl. 5, fig. 8.—WHITEAVES, Geol. Survey Canada, 1901, p. 10.—CHAPMAN, Journ. Linn. Soc. Zoology, vol. 28, 1902, p. 403.—MILLETT, Journ. Roy. Micr. Soc., 1903, p. 269.—EARLAND, Journ. Quekett Micr. Club, ser. 2, vol. 9, 1905, p. 218.—CHAPMAN, Journ. Quekett Micr. Club, ser. 2, vol. 10, 1907, p. 132, pl. 10, fig. 5.—HERON-ALLEN and EARLAND, Journ. Roy. Micr. Soc., 1907, p. 436.—SIDEBOTTOM, Mem. Proc. Manchester Lit. Philos. Soc., vol. 52, No. 13, 1908, p. 1, pl. 1, fig. 4.—CHAPMAN, Subantarctic Ids. New Zealand, 1909, p. 349; Proc. Roy. Soc. Victoria, vol. 22, new series, pt. 2, 1910, p. 281.—SIDEBOTTOM, Mem. Proc. Manchester Lit. Philos. Soc., vol. 54, No. 16, 1910, p. 23.—CHAPMAN, Journ. Linn. Soc. Zoology, vol. 30, 1910, p. 414.—BAGG, Bull. 513, U. S. Geol. Survey, 1912, p. 75, pl. 22, figs. 2 *a–f*.—HERON-ALLEN and EARLAND, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 104.—PEARCEY, Trans. Roy. Soc. Edinb., vol. 49, 1914, p. 1024.—CHAPMAN, Biol. Res. *Endeavour*, vol. 3, pt. 1, 1915, p. 25.—HERON-ALLEN and EARLAND, Trans. Zool. Soc. London, vol. 20, 1915, p. 676; Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 266; Journ. Roy. Micr. Soc., 1916, p. 49.—CHAPMAN, Rep. Sci. Invest., 1916, (1917), pp. 32, 44, 67, pl. 3, fig. 22.—SIDEBOTTOM, Journ. Roy. Micr. Soc., 1918, p. 147.

Uvigerina angularis MESTAYER, Trans. New Zealand Inst., vol. 48, 1916, p. 129.

Uvigerina pygmaea D'ORBIGNY, var. *angulosa* PARKER and JONES, Philos. Trans., vol. 155, 1865, p. 374, pl. 13, fig. 58; pl. 17, fig. 66.

Description.—Test elongate, tapering toward either end, composed of numerous chambers, three making each whorl; chambers compressed at two sides, making a decided angle in the middle and making up a trifacial test, triangular in end view and section; wall more or less costate, usually the costae numerous and distinct; aperture with a short tubular neck and with a phialine lip usually more developed on the outer side.

Length up to 1 mm.

Distribution.—From the above synonymy it will be seen that this species is apparently very widely distributed. Just how many of the above references are to typical material it is impossible, without a study of the originals, to really determine. In the Atlantic the species is well developed and characteristic of the comparatively shallow waters of western Europe. On the western side of the Atlantic it is well developed and abundant only on the northeastern coast of the United States, with scattered records in the colder waters nearly as far south as Cape Hatteras. It is most abundant in waters of 100–300 fathoms (183–549 meters) off the New England coast, and to or beyond the Grand Banks. It is a thick-walled form with somewhat rounded angles, differing in these particulars from European material.

The species is replaced in the warm tropical waters of the Gulf of Mexico and Caribbean by another species, as it is in the Tertiary of the Coastal Plain of the southeastern United States. It is to be suspected that many of the records from various parts of the world when carefully compared with typical material from western Europe will be found to be different.

The form originally described by Brady as *U. spinipes* H. B. Brady and later referred to *U. angulosa* as a variety, has not been found in the Atlantic and is evidently a distinct Pacific species.

Uvigerina angulosa—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
17544	U.S.N.M.	1	D2003....	37 16 30 N.; 74 20 36 W..	641	....	....	Rare.
17545	U.S.N.M.	1	D2022....	37 32 00 N.; 74 13 20 W..	487	40.0	bu. m.......	Rare.
17546	U.S.N.M.	3	D2048....	40 02 00 N.; 68 50 30 W..	547	29.0	crs. s., m. & g.	Few.
17547	U.S.N.M.	10	D2063....	42 28 00 N.; 66 23 00 W..	141	46.0	s., crs. g.....	Common.
17548	U.S.N.M.	10+	D2078....	41 11 30 N.; 66 12 20 W..	499	40.0	gy. m., s....	Abundant.
17549	U.S.N.M.	2	D2084....	40 16 50 N.; 67 05 15 W..	1,290	40.0	bu. m., s....	Rare.
17550	U.S.N.M.	1	D2244....	40 05 15 N.; 70 23 00 W..	67	52.9	gn. m.......	Rare.
17551	U.S.N.M.	2	D2247....	40 03 00 N.; 69 57 00 W..	67	52.4	gn. m., bk. sp.	Rare.
17552	U.S.N.M.	10+	D2262....	30 43 34 N.; 69 29 45 W..	250	41.6	gn. m., s....	Abundant.
17553	U.S.N.M.	2	D2265....	37 07 40 N.; 74 35 40 W..	70	57.9	gn. m., g....	Rare.
17554	U.S.N.M.	1	D2335....	23 10 39 N.; 82 20 21 W..	204	....	....	Rare.
17555	U.S.N.M.	1	D2425....	36 20 24 N.; 76 46 30 W..	119	51.5	dk. gy. m., fine. s.	Rare.
17556	U.S.N.M.	9	D2525....	41 49 00 N.; 65 49 30 W..	72	43.6	s., g., brk. sh.	Common.
17557	U.S.N.M.	10+	D2528....	41 47 00 N.; 65 37 30 W..	677	38.7	br. s.........	Abundant.
17558	U.S.N.M.	10+	D2534....	40 01 00 N.; 67 29 15 W..	1,234	37.8	gy. oz.......	Abundant.
17559	U.S.N.M.	1	D2535....	40 03 30 N.; 67 27 15 W..	1,149	37.8	gy. oz.......	Rare.
17560	U.S.N.M.	10	D2539....	39 59 45 N.; 70 53 00 W..	133	47.7	gn. s.........	Common.
17561	U.S.N.M.	10+	D2542....	40 00 15 N.; 70 42 20 W..	129	47.2	s., brk. sh...	Abundant.
17562	U.S.N.M.	10	D2552....	39 47 07 N.; 70 35 00 W..	721	39.6	gy. oz.......	Common.
17563	U.S.N.M.	1	D2555....	39 53 00 N.; 71 32 00 W..	136	47.7	gn. m., s....	Rare.
17564	U.S.N.M.	1	D2570....	39 54 00 N.; 67 05 30 W..	1,813	36.8	glob. oz.....	Rare.
17565	U.S.N.M.	6	D2572....	40 29 00 N.; 66 04 00 W..	1,769	37.8	gy. oz.......	Few.
17566	U.S.N.M.	10+	D2696....	46 50 30 N.; 45 05 30 W..	98	....	gy. s., bk. sp.	Abundant.
17567	U.S.N.M.	3	D2705....	42 47 00 N.; 61 04 00 W..	1,255	....	lt. br. oz.....	Few.
17568	U.S.N.M.	10+	D2706....	41 28 30 N.; 65 35 30 W..	1,188	....	gy. oz.. for...	Abundant.
17569	U.S.N.M.	1	*Fish Hawk* 1108.	....	......	....	....	Rare.
17570	U.S.N.M.	3	*Fish Hawk* 1110.	....	......	....	....	Few.
17543	U.S.N.M.	4	....	10 miles northwest of Peel, Isle of Man.	60	....	....	Few.
......	J.A.C....	5	....	Coast of Iceland..........	......	....	....	Frequent.

UVIGERINA ASPERULA Czjzek.

There are numerous records for the Atlantic under this name. Those from the western Pacific as far as I have seen material, should be referred to *U. auberiana* D'Orbigny.

Genus SIPHOGENERINA Schlumberger, 1883.

Sagrina PARKER and JONES (not D'Orbigny), Philos. Trans., vol. 155, 1865, p. 363.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 580.—CHAPMAN, The Foraminifera, 1902, p. 201.

Dimorphina SCHWAGER (not D'Orbigny), *Novara*-Exped., Geol. Theil., vol. 2, 1866, p. 251.

Siphogenerina SCHLUMBERGER (type, *S. raphanus* (Parker and Jones)), Feuille des Jeunes Naturalistes, ann. 13, 1883, p. 117.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 104.

Description.—Test elongate, composed at least in the microspheric form of a series of chambers arranged tri- or bi-serially, followed by a later uniserial development; walls hyaline and perforate; aperture in the uniserial portion central and terminal, usually with an elongated neck and flaring lip; interior of the chamber with a tubular connection running from the base of the apertural neck to the lip of the aperture below; wall smooth or ornamented by costae, pits, etc.

Both microspheric and megalospheric forms occur in the various species of this genus. In the microspheric form the early chambers are biserial or triserial, and there is usually a considerable number of them before the adult uniserial development takes place. In the megalospheric form the uniserial condition is taken on much earlier, after only a few of the triserial or biserial chambers are developed.

The genus seems to be limited to the Tertiary, and in the present oceans is best developed in tropical waters under 500 fathoms (914 meters) in depth.

SIPHOGENERINA ADVENA Cushman.

Plate 42, fig. 15.

Siphogenerina advena Cushman, Publ. 311, Carnegie Inst. Washington, 1922, p. 35, pl. 5, fig. 2.

Description.—Test elongate, somewhat compressed, early portion either triserial or biserial, later portion, which makes up the larger portion of the test, uniserial; chambers numerous, distinct, inflated; sutures somewhat depressed, the early portion and a part of the uniserial portion with fine, longitudinal costae, more or less broken, followed by two or three chambers slightly spinose, after which the remaining chambers are smooth and very finely punctate; aperture elliptical, each one connecting with the preceding by an internal funnel-shaped tube.

Length up to 0.65 mm.

Distribution.—This species which was found to be common in the Tortugas region of southern Florida has occurred at two stations in the *Albatross* Atlantic collections. One of them is in the western part of the Caribbean off Central America, the other off the Carolina coast. This is the general distribution of many species that extend throughout the West Indian region and along the coast of South America so that this species probably occurs widely distributed in this general region.

Goës in 1896[33] gave a new name *Sagrina pygmaea* Goës to a small species recorded by him from the Caribbean in 300 fathoms (549 meters). This was originally figured as "*Textularia Pennatula*, var. *aculeata* forma *Bigenerina*."[34] Goës's figure does not show the to be suspected that many of the records from various parts of the world when carefully compared with typical material from western Europe will be found to be different.

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[33] Bull. Mus. Comp. Zoöl., vol. 29, p. 51.

[34] Goës, Kongl. Svensk. Vet. Akad. Handl., vol. 19, no. 4, 1882, p. 79, pl. 5, figs. 165, 166.

The form originally described by Brady as *U. spinipes* H. B. Brady and later referred to *U. angulosa* as a variety, has not been found in the Atlantic and is evidently a distinct Pacific species.

Uvigerina angulosa—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
17544	U.S.N.M.	1	D2003....	37 16 30 N.; 74 20 36 W..	641	....	....	Rare.
17545	U.S.N.M.	1	D2022....	37 32 00 N.; 74 13 20 W..	487	40.0	bu. m.......	Rare.
17546	U.S.N.M.	3	D2048....	40 02 00 N.; 68 50 30 W..	547	39.0	crs. s., m. & g.	Few.
17547	U.S.N.M.	10	D2063....	42 23 00 N.; 66 23 00 W..	141	46.0	s., crs. g.....	Common.
17548	U.S.N.M.	10+	D2078....	41 11 30 N.; 66 12 20 W..	499	40.0	gy. m., s.....	Abundant.
17549	U.S.N.M.	2	D2084....	40 16 50 N.; 67 05 15 W..	1,290	40.0	bu. m., s.....	Rare.
17550	U.S.N.M.	1	D2244....	40 05 15 N.; 70 23 00 W..	67	52.9	gn. m........	Rare.
17551	U.S.N.M.	2	D2247....	40 03 00 N.; 69 57 00 W..	67	52.4	gn. m., bk. sp.	Rare.
17552	U.S.N.M.	10+	D2262....	30 43 34 N.; 69 29 45 W..	250	41.6	gn. m., s.....	Abundant.
17553	U.S.N.M.	2	D2265....	37 07 40 N.; 74 35 40 W..	70	57.9	gn. m., g.....	Rare.
17554	U.S.N.M.	1	D2335....	23 10 39 N.; 82 20 21 W..	204	....	....	Rare.
17555	U.S.N.M.	1	D2425....	36 20 24 N.; 76 46 30 W..	119	51.5	dk. gy. m., fine. s.	Rare.
17556	U.S.N.M.	9	D2525....	41 49 00 N.; 65 40 30 W..	72	43.6	s., g., brk. sh.	Common.
17557	U.S.N.M.	10+	D2528....	41 47 00 N.; 65 37 30 W..	677	38.7	br. s.........	Abundant.
17558	U.S.N.M.	10+	D2534....	40 01 00 N.; 67 29 15 W..	1,234	37.8	gy. oz........	Abundant.
17559	U.S.N.M.	1	D2535....	40 03 30 N.; 67 27 15 W..	1,149	37.8	gy. oz........	Rare.
17560	U.S.N.M.	10	D2539....	39 59 45 N.; 70 53 00 W..	133	47.7	gn. s.........	Common.
17561	U.S.N.M.	10+	D2542....	40 00 15 N.; 70 42 20 W..	129	47.2	s., brk. sh....	Abundant.
17562	U.S.N.M.	10	D2552....	39 47 07 N.; 70 35 00 W..	721	39.6	gy. oz........	Common.
17563	U.S.N.M.	1	D2555....	39 53 00 N.; 71 32 00 W..	136	47.7	gn. m., s.....	Rare.
17564	U.S.N.M.	1	D2570....	30 54 00 N.; 67 05 30 W..	1,813	38.8	glob. oz......	Rare.
17565	U.S.N.M.	6	D2572....	40 29 00 N.; 66 04 00 W..	1,769	37.8	gy. oz........	Few.
17566	U.S.N.M.	10+	D2696....	46 50 30 N.; 45 05 30 W..	98	....	gy. s., bk. sp.	Abundant.
17567	U.S.N.M.	3	D2705....	42 47 00 N.; 61 04 00 W..	1,255	....	lt. br. oz.....	Few.
17568	U.S.N.M.	10+	D2706....	41 28 30 N.; 65 35 30 W..	1,188	....	gy. oz.. for...	Abundant.
17569	U.S.N.M.	1	*Fish Hawk* 1108.	....	....	....	....	Rare.
17570	U.S.N.M.	3	*Fish Hawk* 1110.	....	....	....	....	Few.
17543	U.S.N.M.	4	....	10 miles northwest of Peel, Isle of Man.	60	....	....	Few.
......	J.A.C....	5	....	Coast of Iceland........	....	....	....	Frequent.

UVIGERINA ASPERULA Czjzek.

There are numerous records for the Atlantic under this name. Those from the western Pacific as far as I have seen material, should be referred to *U. auberiana* D'Orbigny.

Genus SIPHOGENERINA Schlumberger, 1883.

Sagrina PARKER and JONES (not D'Orbigny), Philos. Trans., vol. 155, 1865, p. 363.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 580.—CHAPMAN, The Foraminifera, 1902, p. 201.

Dimorphina SCHWAGER (not D'Orbigny), Novara-Exped., Geol. Theil., vol. 2, 1866, p. 251.

Siphogenerina SCHLUMBERGER (type S. [illegible] (Parker and Jones)), Feuille des Jeunes Naturalistes [illegible] 117.—CUSHMAN, Bull. 71, U. S. Nat. Mus. [illegible]

Description.—Test elongate, composed at least in the microspheric form of a series of chambers arranged tri- or bi-serially, followed by a later uniserial development; walls hyaline and perforate; aperture in the uniserial portion central and terminal, usually with an elongated neck and flaring lip; interior of the chamber with a tubular connection running from the base of the apertural neck to the lip of the aperture below; wall smooth or ornamented by costae, pits, etc.

Both microspheric and megalospheric forms occur in the various species of this genus. In the microspheric form the early chambers are biserial or triserial, and there is usually a considerable number of them before the adult uniserial development takes place. In the megalospheric form the uniserial condition is taken on much earlier, after only a few of the triserial or biserial chambers are developed.

The genus seems to be limited to the Tertiary, and in the present oceans is best developed in tropical waters under 500 fathoms (914 meters) in depth.

SIPHOGENERINA ADVENA Cushman.

Plate 42, fig. 15.

Siphogenerina advena CUSHMAN, Publ. 311, Carnegie Inst. Washington, 1922, p. 35, pl. 5, fig. 2.

Description.—Test elongate, somewhat compressed, early portion either triserial or biserial, later portion, which makes up the larger portion of the test, uniserial; chambers numerous, distinct, inflated; sutures somewhat depressed, the early portion and a part of the uniserial portion with fine, longitudinal costae, more or less broken, followed by two or three chambers slightly spinose, after which the remaining chambers are smooth and very finely punctate; aperture elliptical, each one connecting with the preceding by an internal funnel-shaped tube.

Length up to 0.65 mm.

Distribution.—This species which was found to be common in the Tortugas region of southern Florida has occurred at two stations in the *Albatross* Atlantic collections. One of them is in the western part of the Caribbean off Central America, the other off the Carolina coast. This is the general distribution of many species that extend throughout the West Indian region and along the coast of South America so that this species probably occurs widely distributed in this general region.

Goës in 1896[33] gave a new name *Sagrina pygmaea* Goës to a small species recorded by him from the Caribbean in 300 fathoms (549 meters). This was originally figured as "*Textularia Pennatula*, var. *aculeata* forma *Bigenerina*."[34] Goës's figure does not show the ornamental character of this species nor does his description give an adequate opportunity to make the identity of the two certain.

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[33] Bull. Mus. Comp. Zoöl., vol. 29, p. 51.

[34] Goës, Kongl. Svensk. Vet. Akad. Handl., vol. 19, no. 4, 1882, p. 79, 165, 166.

Siphogenerina advena—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
17453	U.S.N.M.	1	D2150....	13 34 45 N.; 81 21 10 W...	382	45.8	wh. crs. s....	Rare.
17454	U.S.N.M.	1	D2814....	34 09 00 N.; 76 02 00 W...	168	....	gy. s., bk. sp.	Rare.

SIPHOGENERINA RAPHANUS (Parker and Jones).

Plate 42, fig. 14.

Uvigerina (Sagrina) raphanus Parker and Jones, Philos. Trans., vol. 155, 1865, p. 364, pl. 18, figs. 16, 17.

Sagrina raphanus H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 585, pl. 75, figs. 21–24.—Chapman, Journ. Linn. Soc., vol. 28, 1900, p. 187; The Foraminifera, 1902, p. 403.—Millett, Journ. Roy. Micr. Soc., 1903, p. 272.—Dakin, Rep. Ceylon Pearl Oyster Fish., vol. 5, 1906, p. 236, pl., fig. 11.—Chapman, Journ. Linn. Soc. Zoology, vol. 30, 1910, p. 415.—Heron-Allen and Earland, Trans. Zool. Soc. London, vol. 20, 1915, p. 677.—Sidebottom, Jour. Roy. Micr. Soc., 1918, p. 148.

Siphogenerina (Sagrina) raphanus Egger, Abh. kön. bay. Akad. Wiss. München, Cl. II, vol. 18, 1893, p. 317, pl. 9, fig. 36.

Siphogenerina raphanus Cushman, Bull. 71, U.S. Nat. Mus., pt. 3, 1913, p. 108, pl. 46, figs. 1–5; Bull. 100, U.S. Nat. Mus., vol. 4, 1921, p. 280, pl. 56, fig. 7; Publ. 311, Carnegie Inst. Washington, 1922, p. 35, pl. 5, fig. 5.

Siphogenerina costata Schlumberger, Feuille des Jeunes Naturalists, ann. 13, 1883, p. 118, fig. 13.

Description.—Test elongate, cylindrical, or tapering; chambers of the uniserial portion broader than long; surface marked by several rather widely separated, well-developed costae, each extending nearly the length of the test and not affected by the sutures; aperture typically with a short tubular neck and well-developed flaring lip.

Length up to 1 mm.

Distribution.—There are published Atlantic records for this species as follows: "shore sands, Bermuda, West Indies, Panama" (H. B. Brady); Tortugas region (Cushman). There is a single specimen in the *Albatross* collections from D2150, in the Carribbean off Central America. The species is much more common in the Indo-Pacific.

It is one of the species which occurs as far westward as the Kerimba Archipelago off southeastern Africa; Ceylon, as far north as Southern Japan, thence across to Hawaii and Samoa, finally appearing in the tropical western Atlantic.

Siphogenerina raphanus—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
17455	U.S.N.M.	1	D2150....	13° 34′ 45″ N.; 81° 21′ 10″ W...	382	°F. 45.8	wh. crs. s....	Rare.

SIPHOGENERINA DIMORPHA (Parker and Jones).

Plate 42, figs. 16–18.

Uvigerina (Sagrina) dimorpha PARKER and JONES, Philos. Trans., vol. 155, 1865, p. 420, pl. 18, fig. 18.

Sagrina dimorpha H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 582, pl. 76, figs. 1–3; Journ. Roy. Micr. Soc., 1887, p. 915.—H. B. BRADY, PARKER, and JONES, Trans. Zool. Soc. London, vol. 12, 1888, p. 225, pl. 45, fig. 6.—Goës, Kongl. Svensk. Vet. Akad. Handl., vol. 25, No. 9, 1894, p. 52, pl. 9, figs. 510, 511.—BAGG, Bull. U. S. Nat. Mus., vol. 34, 1908, p. 152.—HERON-ALLEN and EARLAND, Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 266.—SIDEBOTTOM, Journ. Roy. Micr. Soc., 1918, p. 148.

Siphogenerina dimorpha EGGER, Abh. kön. bay. Akad. Wiss. München, Cl. II, vol. 18, 1893, p. 317, pl. 9, fig. 30.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 106, pl. 45, figs. 3, 4; Bull. 100, U. S. Nat. Mus., vol. 4, 1921, p. 279, pl. 56, fig. 8.

Description.—Test either somewhat compressed or nearly cylindrical, very slightly tapering from the somewhat rounded initial end to the greatest width near the apertural end; chambers comparatively few, rather broader than high, slightly inflated; sutures distinct, the basal portion of the last few chambers somewhat excavated and tending to bridge the sutures between the excavations at regular intervals; wall with a coarsely pitted surface; aperture circular, terminal, at the end of a short neck, usually with a distinctly phialine lip.

Length of Atlantic specimens not over 0.60 mm.

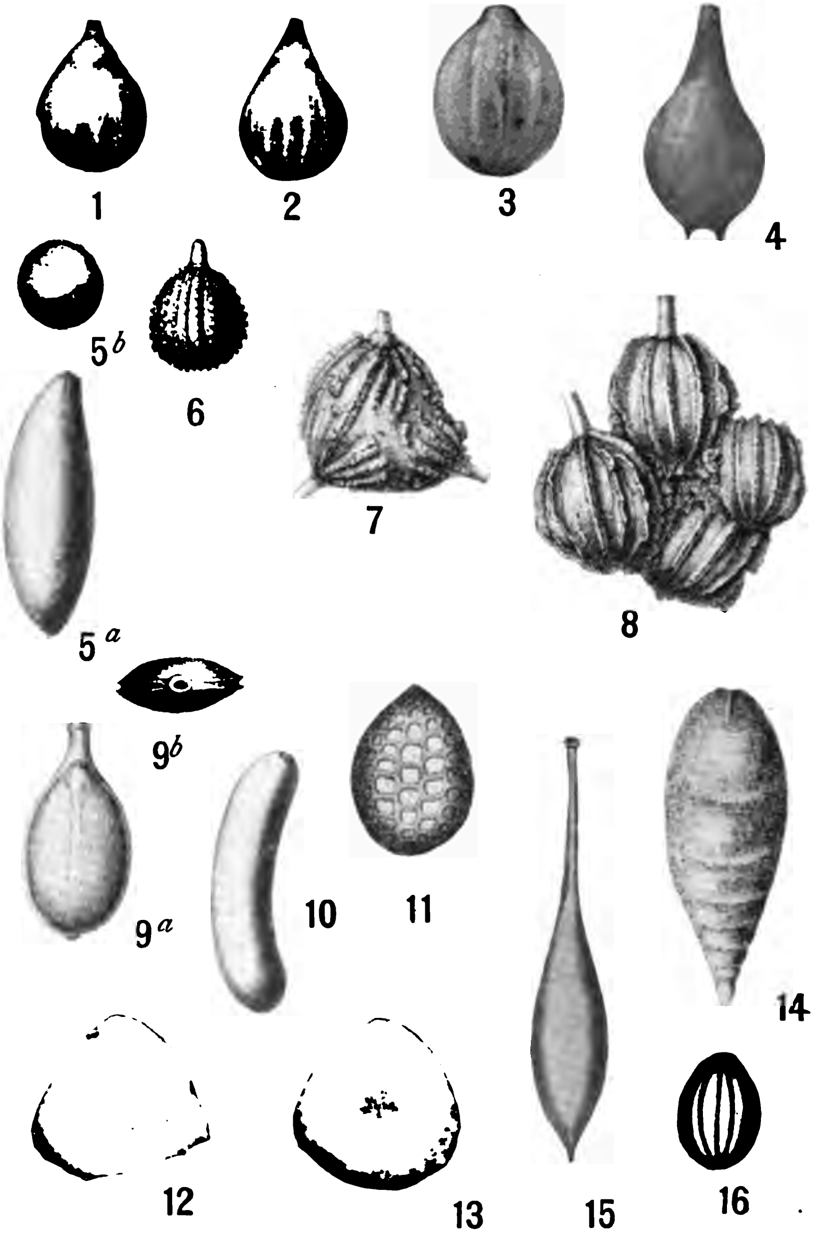
Distribution.—This is a widely distributed species, although, as will be noted later, there may be more than one variety. The original stations given by Parker and Jones are Red Sea (near the Isle of Shadwan) at 372 fathoms (681 meters); Abrohlos Bank, 260 fathoms (476 meters); Australian Coral-reefs, 17 fathoms (31 meters). Brady gives the following notes as to its distribution, in the *Challenger* report:

> The geographical area inhabited by *Sagrina dimorpha* is wider than that of any other species of the same genus. It extends as far north as Bukken and Oster Fiords, near Bergen, Norway (Norman); and a single specimen from the Scottish coast is reported by Mr. Robertson. It has been further noticed in the North Atlantic, off Gomera, Canaries, 620 fathoms (1,134 meters); and off Culebra Island, West Indies, 390 fathoms (713 meters); in the South Atlantic, off Ascension, 420 fathoms (768 meters); and on the

Description.—Test free, branching, composed of nearly globular chambers connected by stolon-like tubes; wall hyaline, usually hispid; apertures tubular, often several to a single chamber.

Length up to nearly 2 mm.

Distribution.—There are several records for this species in the Atlantic, but I have not found any material which I could refer to it.



LAGENIDAE OF THE ATLANTIC OCEAN.

FOR EXPLANATION OF PLATE SEE PAGE 179.

UNIV. OF MICH.

EXPLANATION OF PLATES.

PLATE 1.

FIGS. 1, 2. *Lagena acuticosta*. ×50. Front views. D2395.

3. *Lagena acuticosta*. ×50. Front view. In 8 fathoms, off Cape Porpoise, Maine.

4. *Lagena advena*. ×50. Front views. D2150.

5. *Lagena apiculata*. ×75. *a*, front view; *b*, apertural view. After H. B. Brady.

6–8. *Lagena aspera*. ×100. Figures 7 and 8, abnormal specimens. After Balkwill and Wright.

9. *Lagena bicarinata*. ×100. *a*, front view; *b*, apertural view. After Balkwill and Wright.

10. *Lagena botelliformis*. ×75. After H. B. Brady.

11. *Lagena catenulata*. After Williamson.

12, 13. *Lagena castanea*. ×50. Front views. D2144.

14. *Lagena chrysalis*. ×120. After Heron-Allen and Earland.

15. *Lagena clavata*. After Williamson.

16. *Lagena costata*. After Williamson.

PLATE 2.

FIG. 1. *Lagena costata.* ×100. *a*, front view; *b*, apertural view. After Balkwill and Wright.

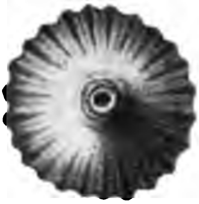
2. *Lagena costata.* ×100. Bilocular specimen. After Balkwill and Wright.

3, 4. *Lagena crenata.* ×100. "Typical form." Figure 3, "specimen with very few crenations." After Balkwill and Wright.

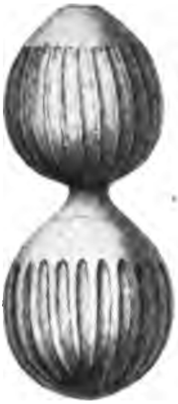
5–7. *Lagena curvilineata.* ×100. After Balkwill and Wright.

8. *Lagena curvilineata.* ×100. *a* and *b*, opposite sides of same specimen. After Balkwill and Wright.

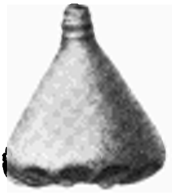
9. *Lagena curvilineata.* ×75. After Heron-Allen and Earland.



1^b



2



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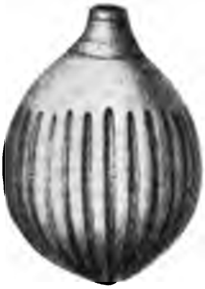

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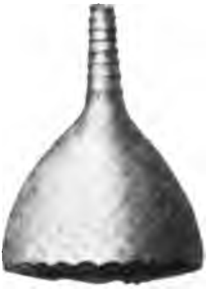

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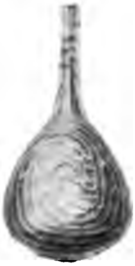

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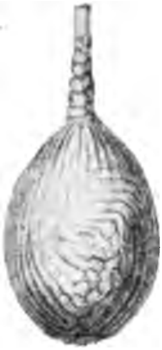

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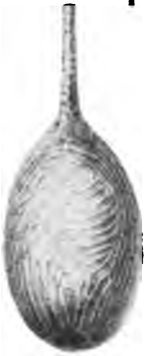

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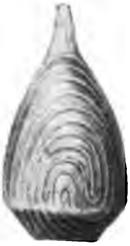

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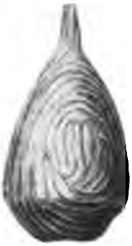

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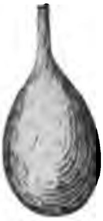

9

LAGENIDAE OF THE ATLANTIC OCEAN.

FOR EXPLANATION OF PLATE SEE PAGE 180.

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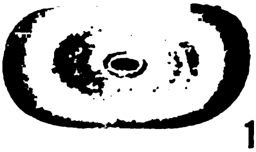
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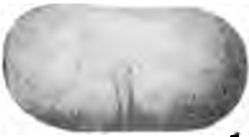
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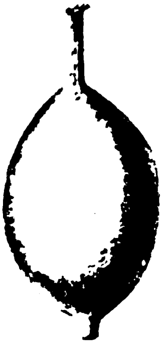
1^{c}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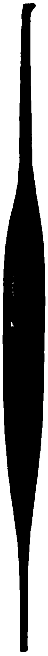
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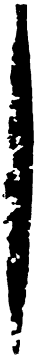
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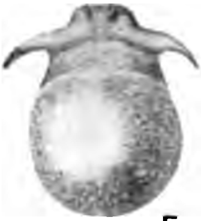
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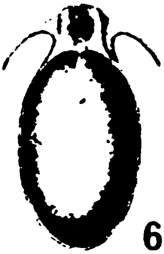
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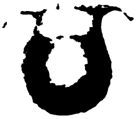
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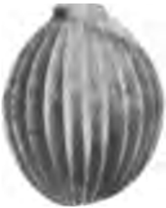
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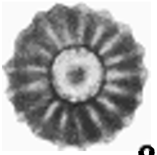
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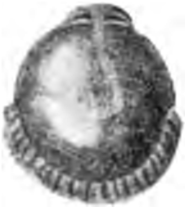
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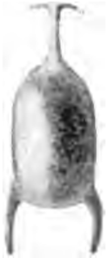
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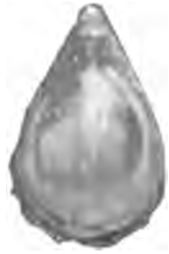
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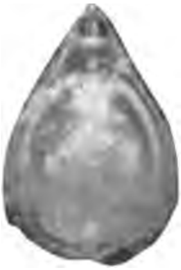
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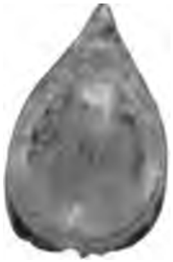

13

LAGENIDAE OF THE ATLANTIC OCEAN.

FOR EXPLANATION OF PLATE SEE PAGE 181.

PLATE 3.

FIG. 1. *Lagena cymbula.* X200. *a*, apertural view; *b*, viewed from below; *c*, side view. After Heron-Allen and Earland.

2. *Lagena distoma.* X75. After Heron-Allen and Earland.

3. *Lagena distoma.* X40. D2112.

4. *Lagena elongata.* X40. D2754.

5. *Lagena falcata.* X120. "Globosa type." After Heron-Allen and Earland.

6. *Lagena falcata.* X200. "Oval type." After Heron-Allen and Earland.

7. *Lagena falcata.* X160. "Short form." After Heron-Allen and Earland.

8. *Lagena costata.* X150. *a*, front view; *b*, apertural view. After Heron-Allen and Earland.

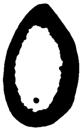
9. *Lagena fimbriata.* X120. After Heron-Allen and Earland.

10. *Lagena forficula.* X200. After Heron-Allen and Earland.

11–13. *Lagena flintiana.* X50. Front views. D2144.

PLATE 4.

FIG. 1. *Lagena globosa.* *a,* front view; *b,* apertural view. After Williamson.
2. *Lagena globosa.* Viewed by transmitted light. After Williamson.
3, 4. *Lagena gracilis.* After Williamson.
5. *Lagena gracillima.* ×40. D2555.
6. *Lagena hexagona.* After Williamson.
7. *Lagena hispida.* ×50. D2150.
8. *Lagena hispida.* ×170. After Heron-Allen and Earland.
9–11. *Lagena iota.* ×50. Figures 9 and 10, front views. Figure 11, side view. D2041.
12, 13. *Lagena lacunata.* ×113. After Heron-Allen and Earland.



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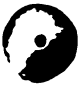
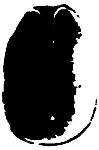


1^{b}



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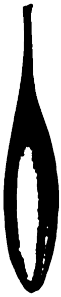

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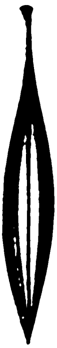

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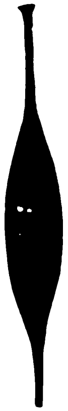

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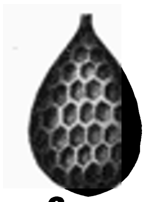

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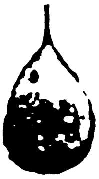

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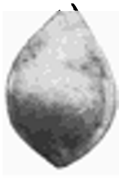

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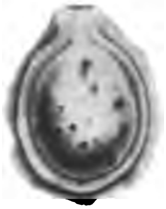

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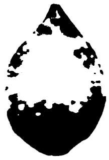

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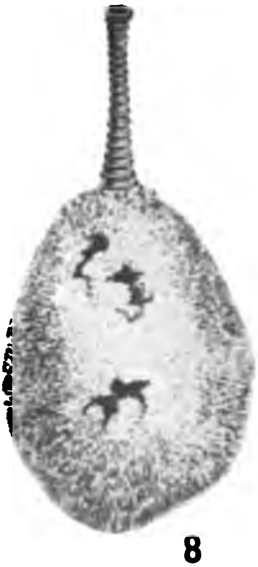

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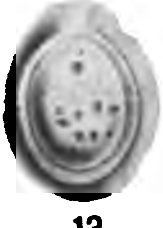

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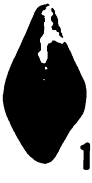

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LAGENIDAE OF THE ATLANTIC OCEAN.

FOR EXPLANATION OF PLATE SEE PAGE 182.

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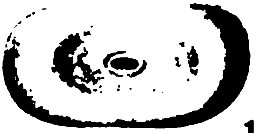
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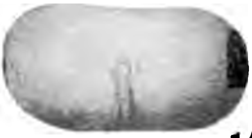
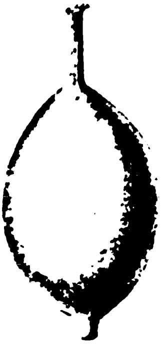

1^b

1^c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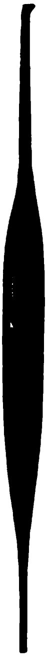
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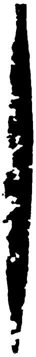
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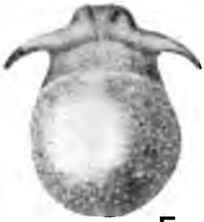
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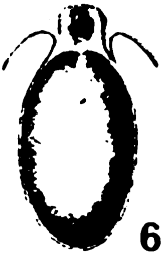
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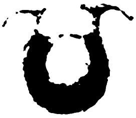
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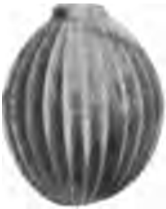
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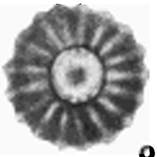
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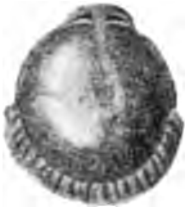
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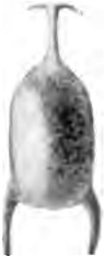
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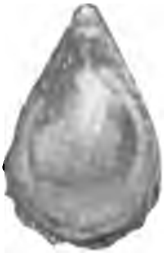
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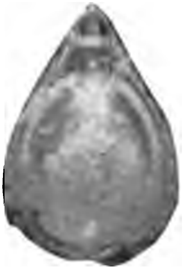
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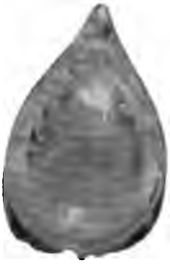
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LAGENIDAE OF THE ATLANTIC OCEAN.

FOR EXPLANATION OF PLATE SEE PAGE 181.

PLATE 3.

FIG. 1. *Lagena cymbula.* ×200. *a*, apertural view; *b*, viewed from below; *c*, side view. After Heron-Allen and Earland.

2. *Lagena distoma.* ×75. After Heron-Allen and Earland.

3. *Lagena distoma.* ×40. D2112.

4. *Lagena elongata.* ×40. D2754.

5. *Lagena falcata.* ×120. "Globosa type." After Heron-Allen and Earland.

6. *Lagena falcata.* ×200. "Oval type." After Heron-Allen and Earland.

7. *Lagena falcata.* ×160. "Short form." After Heron-Allen and Earland.

8. *Lagena costata.* ×150. *a*, front view; *b*, apertural view. After Heron-Allen and Earland.

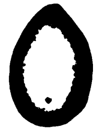
9. *Lagena fimbriata.* ×120. After Heron-Allen and Earland.

10. *Lagena forficula.* ×200. After Heron-Allen and Earland.

11–13. *Lagena flintiana.* ×50. Front views. D2144.

PLATE 4.

FIG. 1. *Lagena globosa.* *a*, front view; *b*, apertural view. After Williamson.
2. *Lagena globosa.* Viewed by transmitted light. After Williamson.
3, 4. *Lagena gracilis.* After Williamson.
5. *Lagena gracillima.* ×40. D2555.
6. *Lagena hexagona.* After Williamson.
7. *Lagena hispida.* ×50. D2150.
8. *Lagena hispida.* ×170. After Heron-Allen and Earland.
9–11. *Lagena iota.* ×50. Figures 9 and 10, front views. Figure 11, side view. D2041.
12, 13. *Lagena lacunata.* ×113. After Heron-Allen and Earland.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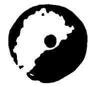
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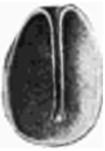
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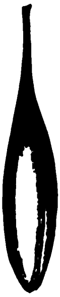
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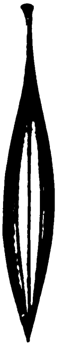
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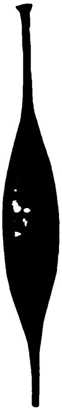
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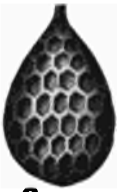
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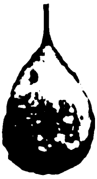
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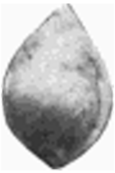
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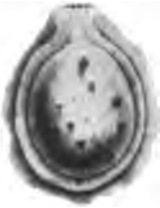
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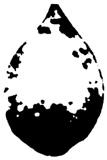
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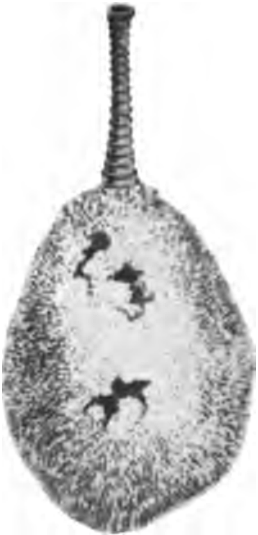
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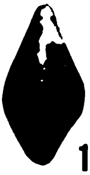
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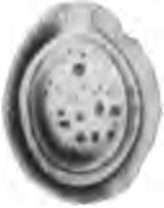
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LAGENIDAE OF THE ATLANTIC OCEAN.

FOR EXPLANATION OF PLATE SEE PAGE 182.

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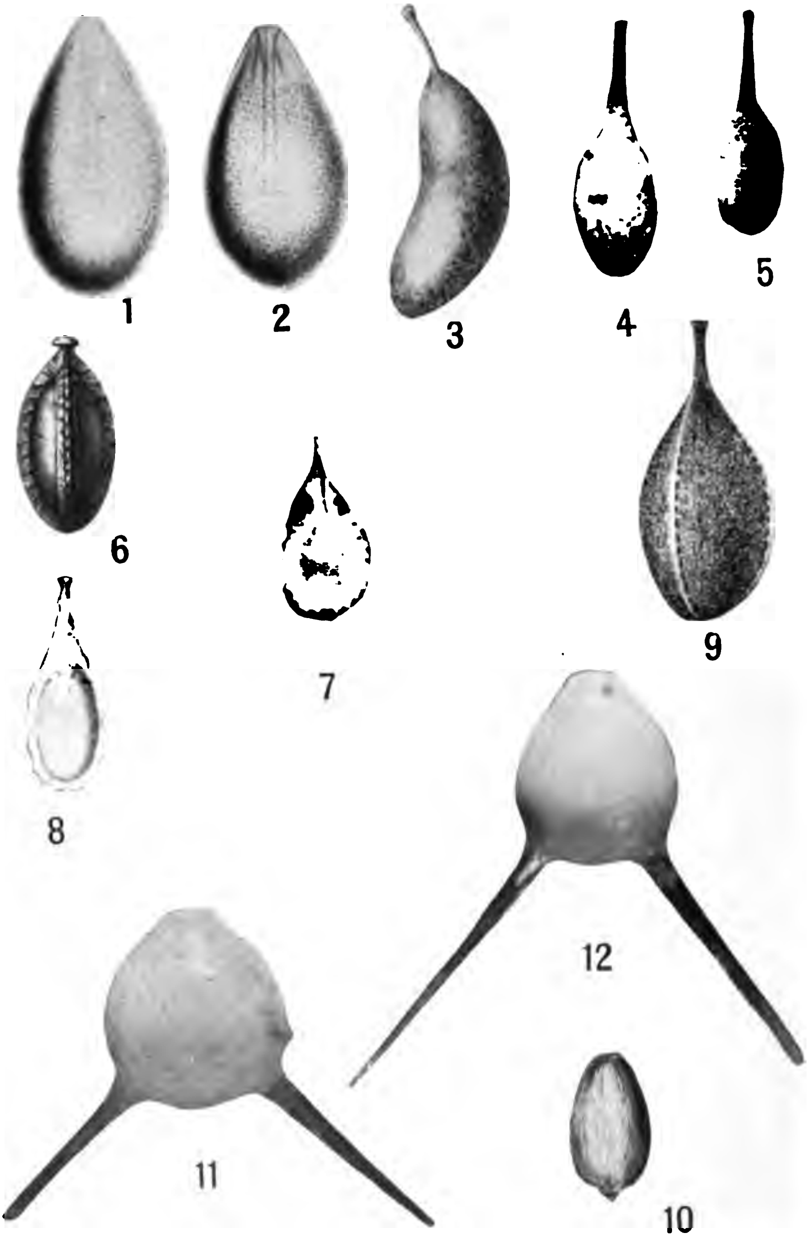


LAGENIDAE OF THE ATLANTIC OCEAN.

FOR EXPLANATION OF PLATE SEE PAGE 183.

PLATE 5.

FIGS. 1, 2. *Lagena laevigata.* ×150. After Heron-Allen and Earland.

3. *Lagena laevis.* ×75. "Curved type." After Heron-Allen and Earland.

4. *Lagena laevis*, var. *nebulosa.* ×50. D2144.

5. *Lagena laevis*, var. *nebulosa.* ×50. D2713.

6. *Lagena lagenoides.* ×100. "Trigonal." After Balkwill and Wright.

7. *Lagena lagenoides.* ×40. D2150.

8. *Lagena lagenoides.* After Williamson.

9. *Lagena lagenoides*, var. *tenuistriata.* ×120. "Trigonal specimen." After Heron-Allen and Earland.

10. *Lagena lineata.* After Williamson.

11. *Lagena longispina.* ×40. D2394.

12. *Lagena longispina.* ×40. D2097.

PLATE 6.

FIG. 1. *Lagena lucida.* *a*, front view; *b*, apertural view. After Williamson.

2. *Lagena lucida*, var. After Williamson.

3. *Lagena lyelli.* ×75. After Heron-Allen and Earland.

4. *Lagena malcomsonii.* ×120. After Heron-Allen and Earland.

5. *Lagena lineata.* ×100. After Balkwill and Wright.

6. *Lagena lineata.* ×100. With basal spine. After Balkwill and Wright.

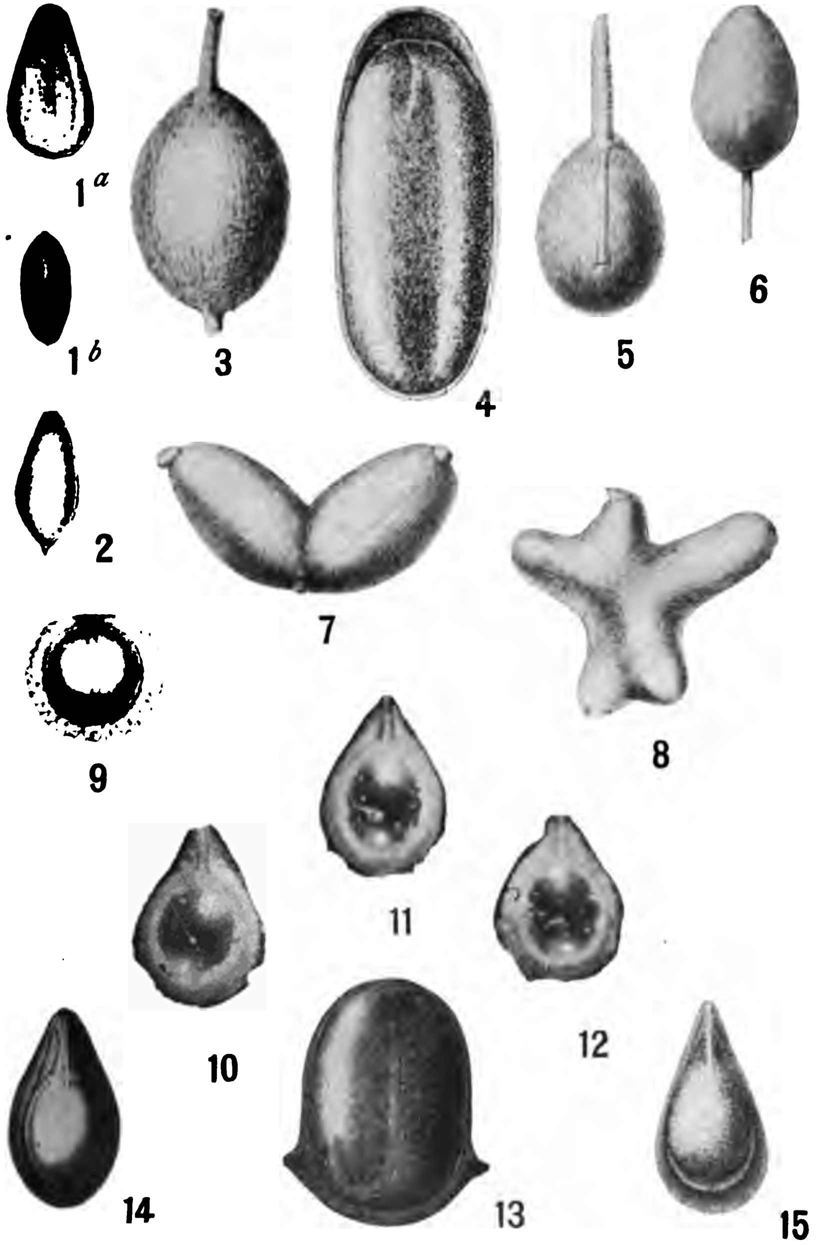
7, 8. *Lagena lineata.* ×100. "Abnormal." After Balkwill and Wright.

9. *Lagena marginata.* ×113. After Heron-Allen and Earland.

10–12. *Lagena orbignyana*, var. *elliptica.* ×50. Front views. D2150.

13. *Lagena marginata*, var. *semicarinata.* ×200. After Heron-Allen and Earland.

14, 15. *Lagena marginata*, var. *semimarginata.* Fig. 14, ×60; fig. 15, ×75. After H. B. Brady.



LAGENIDAE OF THE ATLANTIC OCEAN.

FOR EXPLANATION OF PLATE SEE PAGE 184.

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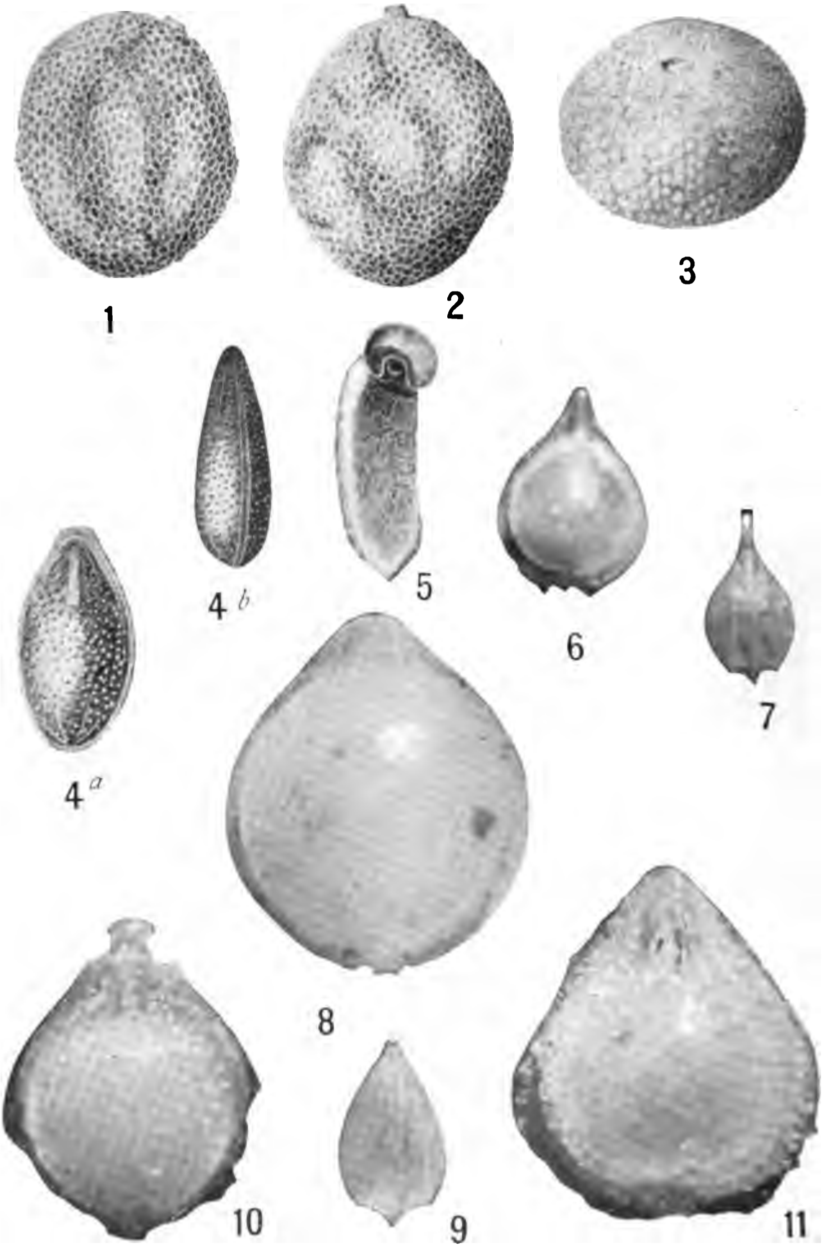


Lagenidae of the Atlantic Ocean.

For explanation of plate see page 185

PLATE 7.

FIGS. 1, 2. *Lagena montagui.* ×75. "Compressed types." After Heron-Allen and Earland.

3. *Lagena montagui.* ×75. "Globose type." After Heron-Allen and Earland.

4. *Lagena marginato-perforata.* ×200. *a*, front view; *b*, side view. After Heron-Allen and Earland.

5. *Lagena millettii.* ×120. After Heron-Allen and Earland.

6, 7. *Lagena orbignyana*, var. *caribaea.* ×50. Fig. 6, front view; fig. 7, side view. D2144.

8, 9. *Lagena orbignyana*, var. *caribaea.* ×50. Fig. 8, front view; fig. 9, side view. D2144.

10. *Lagena orbignyana*, var. *antillea.* ×40. Front view. H79.

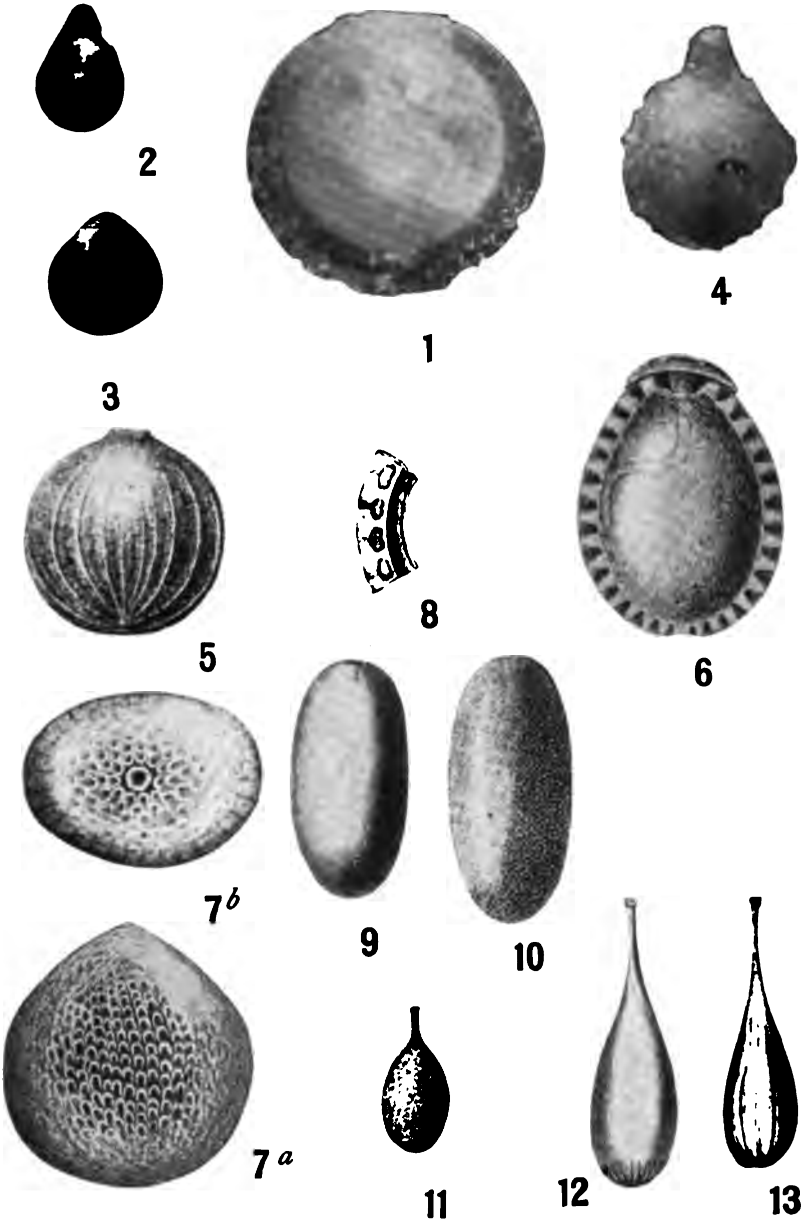
11. *Lagena orbignyana*, var. *antillea.* ×40. Front view. D2355.

PLATE 8.

FIG. 1. *Lagena marginata*, var. ×40. D2150.

2. *Lagena orbignyana*, var. *variabilis*. ×50. Front view. D2097.
3. *Lagena orbignyana*, var. ×50. Front view. D2564.
4. *Lagena orbignyana*, var. ×50. Front view. D2260.
5. *Lagena orbignyana*, var. *clathrata*. ×75. After Heron-Allen and Earland.
6. *Lagena ornata*. ×200. After Heron-Allen and Earland.
7. *Lagena montagui*. ×75. *a*, front view; *b*, apertural view. After Wright.
8. *Lagena ornata*. "Part of the peripheral carina." After Williamson.
9. *Lagena ovum*. ×75. After H. B. Brady.
10. *Lagena ovum*. ×120. After Heron-Allen and Earland.
11. *Lagena paradoxa*. ×50. D2352.

12, 13. *Lagena perlucida*. After Williamson.



LAGENIDAE OF THE ATLANTIC OCEAN.

FOR EXPLANATION OF PLATE SEE PAGE 186.

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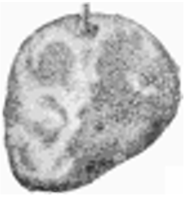

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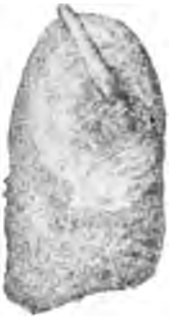

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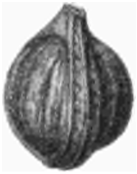

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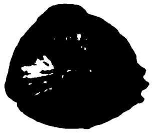

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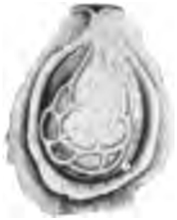

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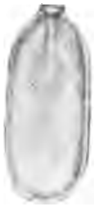

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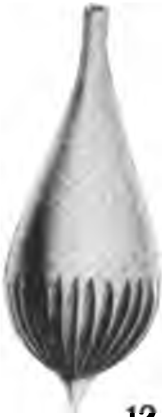

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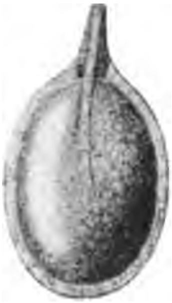

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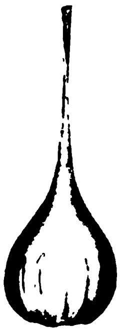

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Lagenidae of the Atlantic Ocean.

For explanation of plate see page 187.

PLATE 9.

FIGS. 1, 2. *Lagena protea.* ×75. After Heron-Allen and Earland

3. *Lagena pulchella.* ×100. "Trigonal." *a*, front view; *b*, apertural view. After Balkwill and Wright.

4. *Lagena pulchella*, var. *hexagona.* ×113. After Heron-Allen and Earland.

5, 6. *Lagena quadrata.* After Williamson.

7–11. *Lagena reniformis.* ×113. After Heron-Allen and Earland.

12, 13. *Lagena semilineata.* ×113. After Heron-Allen and Earland.

14. *Lagena rizzae.* ×120. After Heron-Allen and Earland.

15. *Lagena semistriata.* After Williamson.

PLATE 10.

FIGS. 1, 2. *Lagena spumosa.* ×150. After Heron-Allen and Earland. Figure 2, "external shell broken away, showing internal structure."

3. *Lagena squamosa.* After Williamson.

4. *Lagena squamosa.* ×100. "Bilocular." After Balkwill and Wright.

5, 6. *Lagena stelligera.* ×75. 5*a*, front view; 5*b*, apertural view; 6*a*, front view; 6*b*, apertural view. After H. B. Brady.

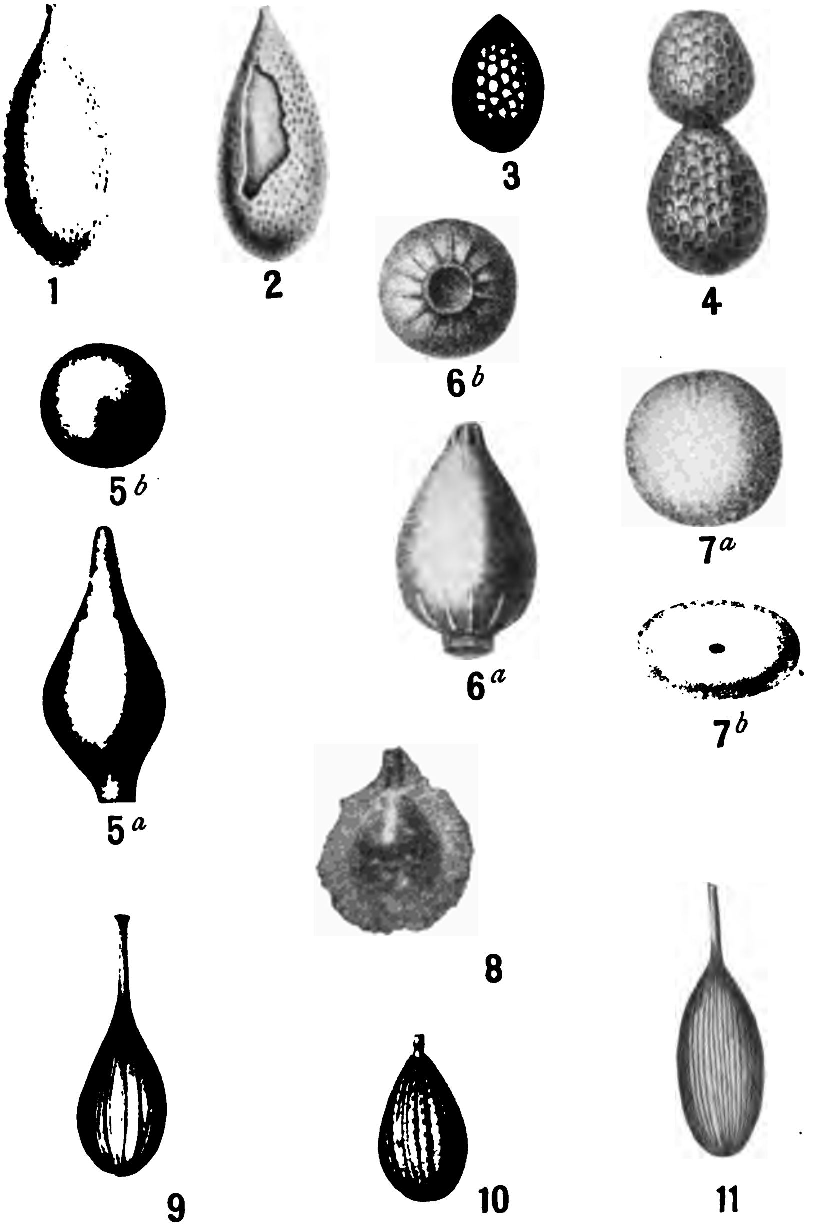
7. *Lagena stewartii.* ×120. *a*, front view; *b*, apertural view. After Heron-Allen and Earland.

8. *Lagena sublagenoides.* ×40. D2377.

9. *Lagena striata.* After Williamson.

10. *Lagena striato-punctata.* ×100. After Balkwill and Wright.

11. *Lagena substriata.* After Williamson.



Lagenidae of the Atlantic Ocean.

For explanation of plate see page 188.

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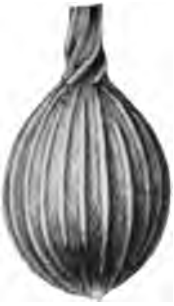
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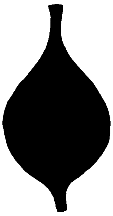
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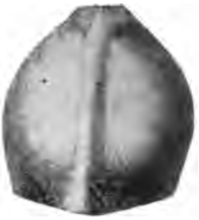
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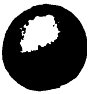
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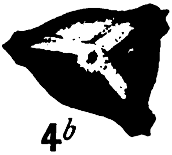
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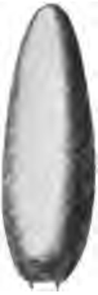
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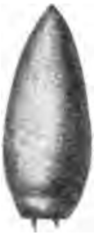
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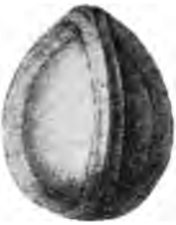
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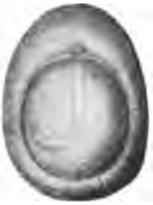
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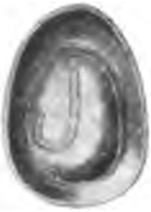
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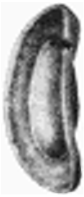
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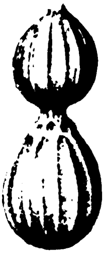
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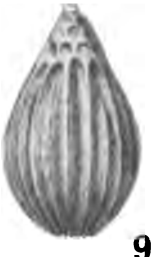
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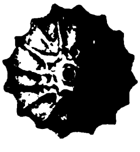
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Lagenidae of the Atlantic Ocean.

For explanation of plate see page 189.

PLATE 11.

FIG. 1. *Lagena sulcata.* ×100. After Balkwill and Wright.

2. *Lagena sulcata*, var. *apiculata.* ×50. D2144.

3. *Lagena trigono-marginata.* ×100. After H. B. Brady.

4. *Lagena trigono-marginata.* ×100. *a*, front view; *b*, apertural view. After H. B. Brady.

5. *Lagena truncata.* ×75. After H. B. Brady.

6. *Lagena truncata.* ×75. *a*, front view; *b*, apertural view. After H. B. Brady.

7. *Lagena unguis.* ×120. *a* and *b*, opposite sides; *c*, side view. After Heron-Allen and Earland.

8. *Lagena williamsoni.* ×100. "Bilocular." After Balkwill and Wright.

9. *Lagena williamsoni.* ×100. *a*, front view; *b*, apertural view. After Balkwill and Wright.

PLATE 12.

FIG. 1. *Nodosaria filiformis.* ×15. Side view. D2378.

2. *Nodosaria filiformis.* ×15. Side view. D2614.

3, 4. *Nodosaria communis.* ×113. "Compressed or vaginuline form." After Heron-Allen and Earland.

5–7. *Nodosaria mucronata.* ×15. Side view. D2041.

8. *Nodosaria* (*Glandulina*) *laevigata*, var. *occidentalis.* ×30. Side view. D2003.

9. *Nodosaria subannulata.* ×25. Side view D2682.

10. *Nodosaria* (*Glandulina*) *laevigata*, var. *torrida.* ×30. Side view. D2398.

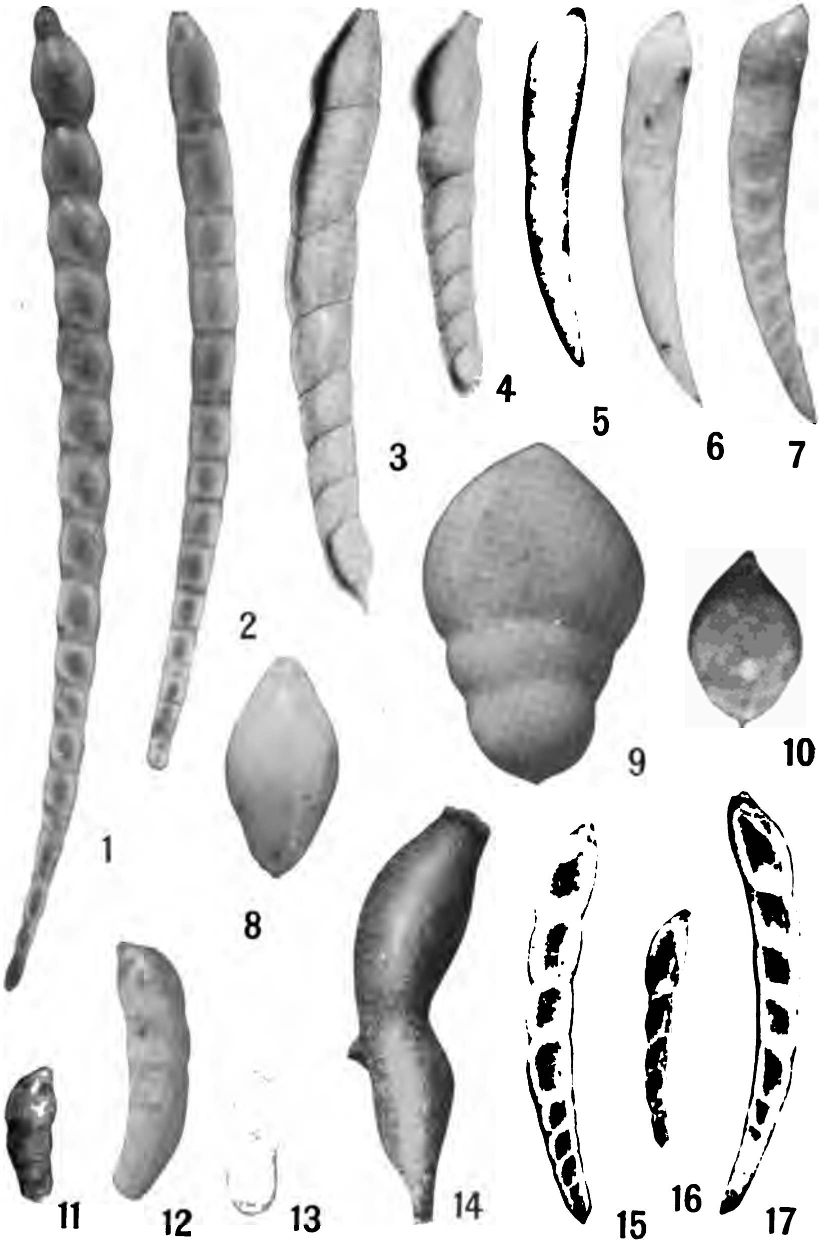
11. *Nodosaria atlantica.* ×30. Side view. D2400.

12. *Nodosaria atlantica.* ×30. Side view of type specimen. D2756.

13. *Nodosaria calomorpha.* ×35. Side view. D2543.

14. *Nodosaria simplex.* ×120. Side view of peculiarly formed specimen. After Heron-Allen and Earland.

15–17. *Nodosaria communis.* ×25. Side views. D2377.



LAGENIDAE OF THE ATLANTIC OCEAN.

FOR EXPLANATION OF PLATE SEE PAGE 190.

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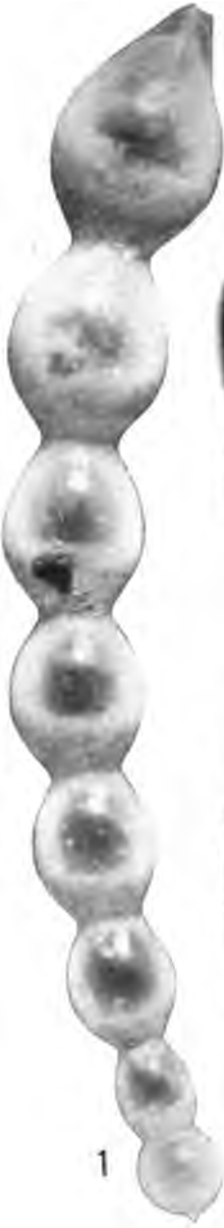
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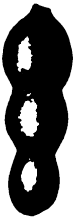
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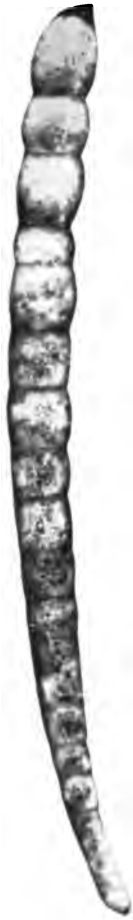
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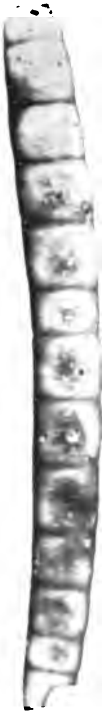
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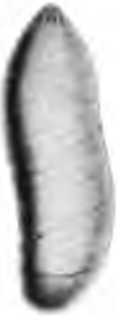
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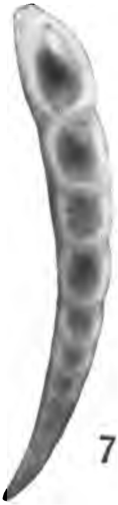
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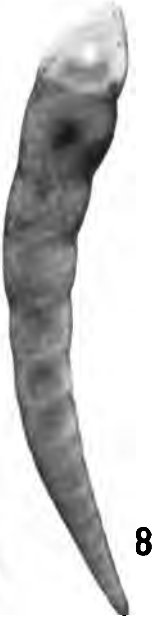
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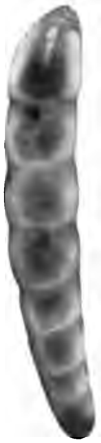
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LAGENIDAE OF THE ATLANTIC OCEAN.

FOR EXPLANATION OF PLATE SEE PAGE 191.

PLATE 13.

FIG. 1. *Nodosaria subsoluta.* ×25. Side view of type specimen. D2751.

2. *Nodosaria soluta.* ×120. Side view. After Heron-Allen and Earland.

3–5. *Nodosaria consobrina*, var. *emaciata.* ×15. Side view. D2399.

6. *Nodosaria roemeri.* ×113. Side view. After Heron-Allen and Earland.

7–9. *Nodosaria mucronata.* ×15. Figures 7 and 8, side views of microspheric specimens; figure 9, side view of megalospheric specimen.

PLATE 14.

FIG. 1. *Nodosaria flintii.* ×25. Side view. D2682.

2–4. *Nodosaria intercellularis.* ×30. Side views. Figure 3, young with only three chambers developed; figure 2, adult with four chambers; figure 4, broken specimen showing final chamber. D2756.

5. *Nodosaria comatula.* ×30. Side view. D2377.

6. *Nodosaria vertebralis.* ×25. Side view. D2400.

7. *Nodosaria*, species. ×30. Side view. D2614.

8. *Nodosaria farcimen.* ×30. Side view. D2144.

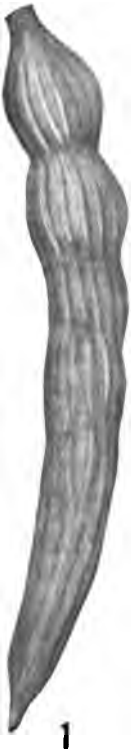
9. *Nodosaria antillea.* ×30. Side view of type specimen. D2614.

10. *Nodosaria simplex.* ×30. Side view. D2763.

11. *Nodosaria farcimen.* ×40. Side view. D2144.

12. *Nodosaria advena.* ×25. Side view. D2689.

13. *Nodosaria pauperata.* ×30. Side view. D2018.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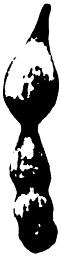
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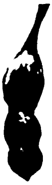
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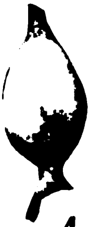
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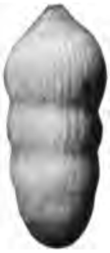
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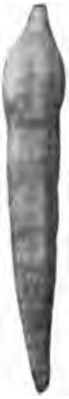
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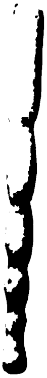
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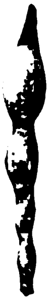
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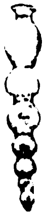
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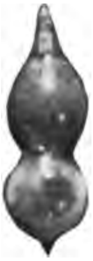
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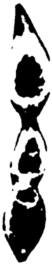
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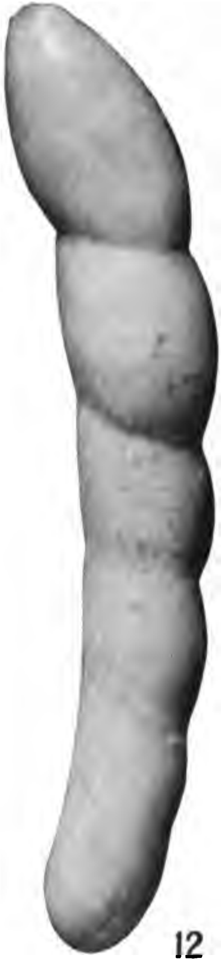
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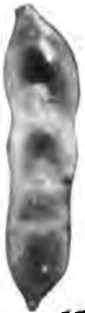
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LAGENIDAE OF THE ATLANTIC OCEAN.

FOR EXPLANATION OF PLATE SEE PAGE 192.

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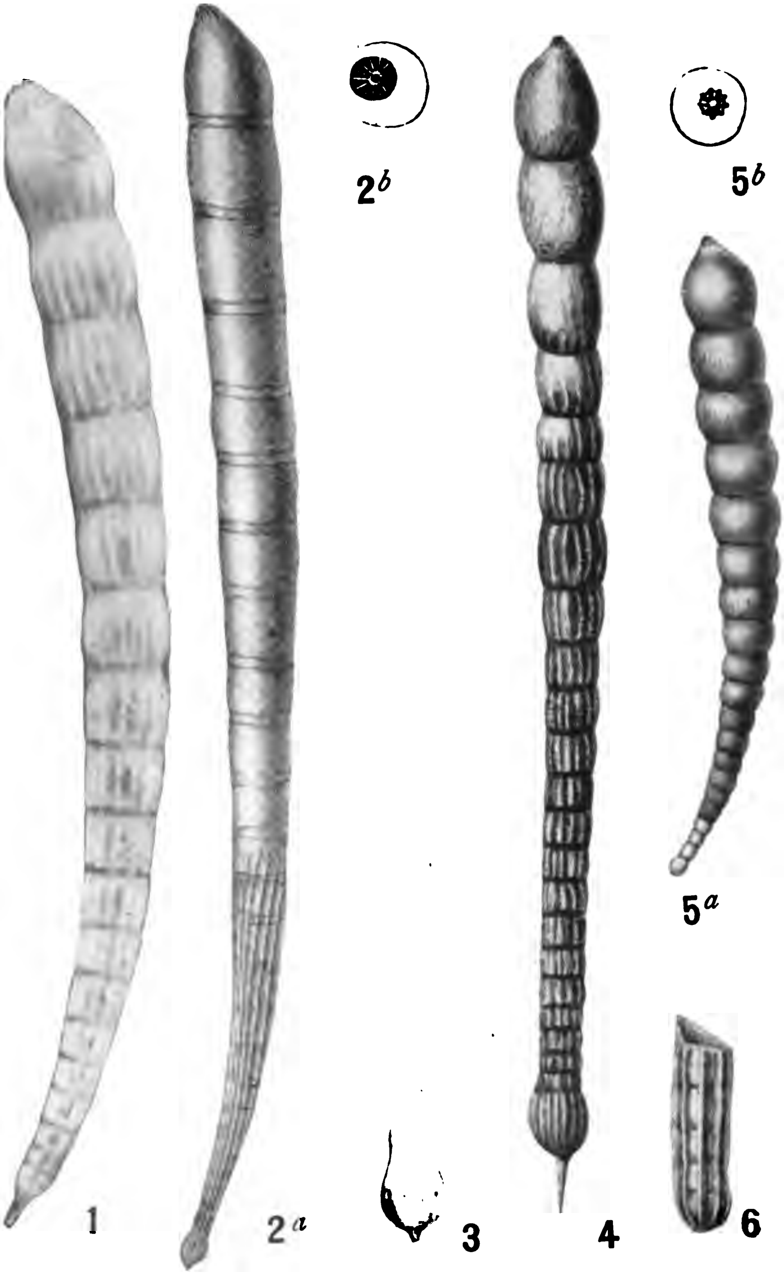


LAGENIDAE OF THE ATLANTIC OCEAN.

FOR EXPLANATION OF PLATE SEE PAGE 193.

PLATE 15.

FIG. 1. *Nodosaria vertebralis*, var. *albatrossi*. ×25. Side view. D2377.

2. *Nodosaria seminuda*. ×25. *a*, side view; *b*, apertural view. After Goës.

3. *Nodosaria proxima*. ×50. Side view. D2262.

4. *Nodusaria raphanistrum*, var. *obsoleta*. ×8. Side view. After Goës.

5. *Nodosaria striolata*. *a*, side view; *b*, apertural view. After Goës.

6. *Nodosaria raphanus*. ×25. Side view. After Balkwill and Wright.

PLATE 16.

FIG. 1. *Nodosaria pyrula.* ×25. Side view. After Balkwill and Wright.

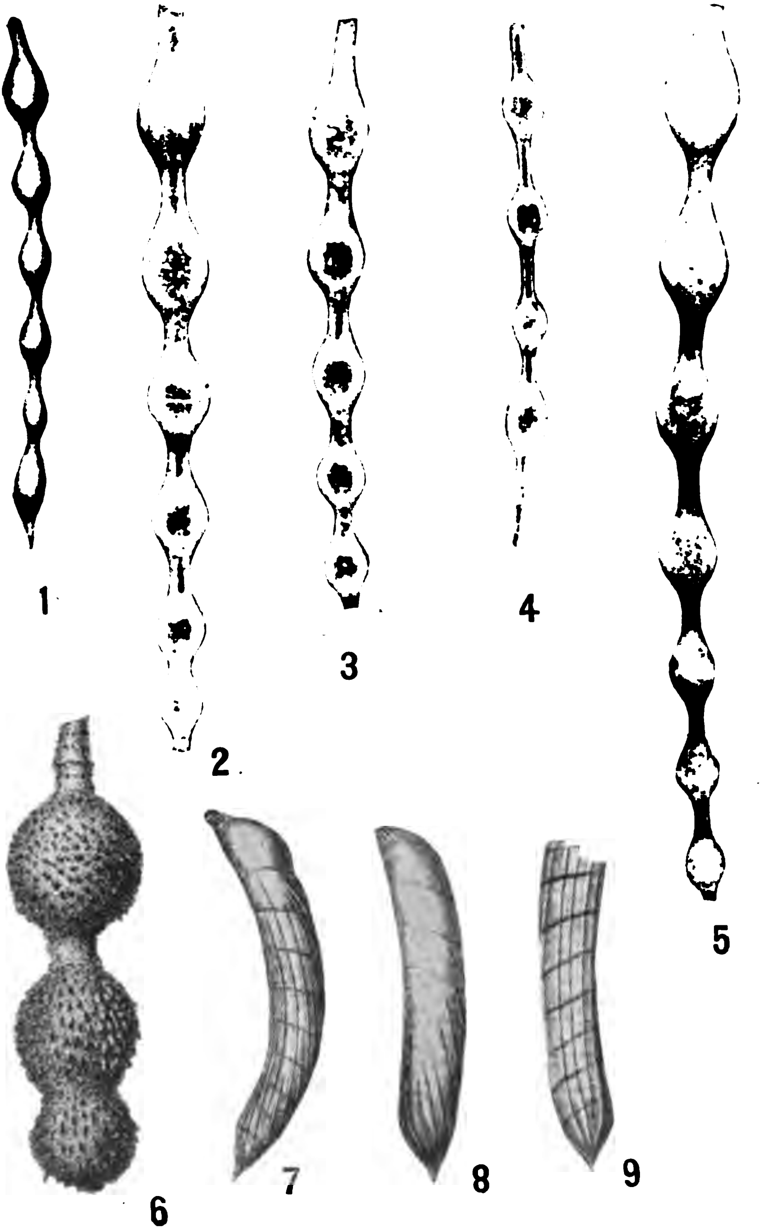
2, 3. *Nodosaria pyrula.* ×25. Side views. D2314.

4. *Nodosaria pyrula.* ×25. Side view, showing the proloculum with its long spinose tip. D2377.

5. *Nodosaria pyrula*, var. *semirugosa.* ×25. Side view. D2378.

6. *Nodosaria hispida.* ×50. Side view. After Balkwill and Wright.

7–9. *Vaginulina linearis.* Side views. After Williamson.



LAGENIDAE OF THE ATLANTIC OCEAN.

FOR EXPLANATION OF PLATE SEE PAGE 194.

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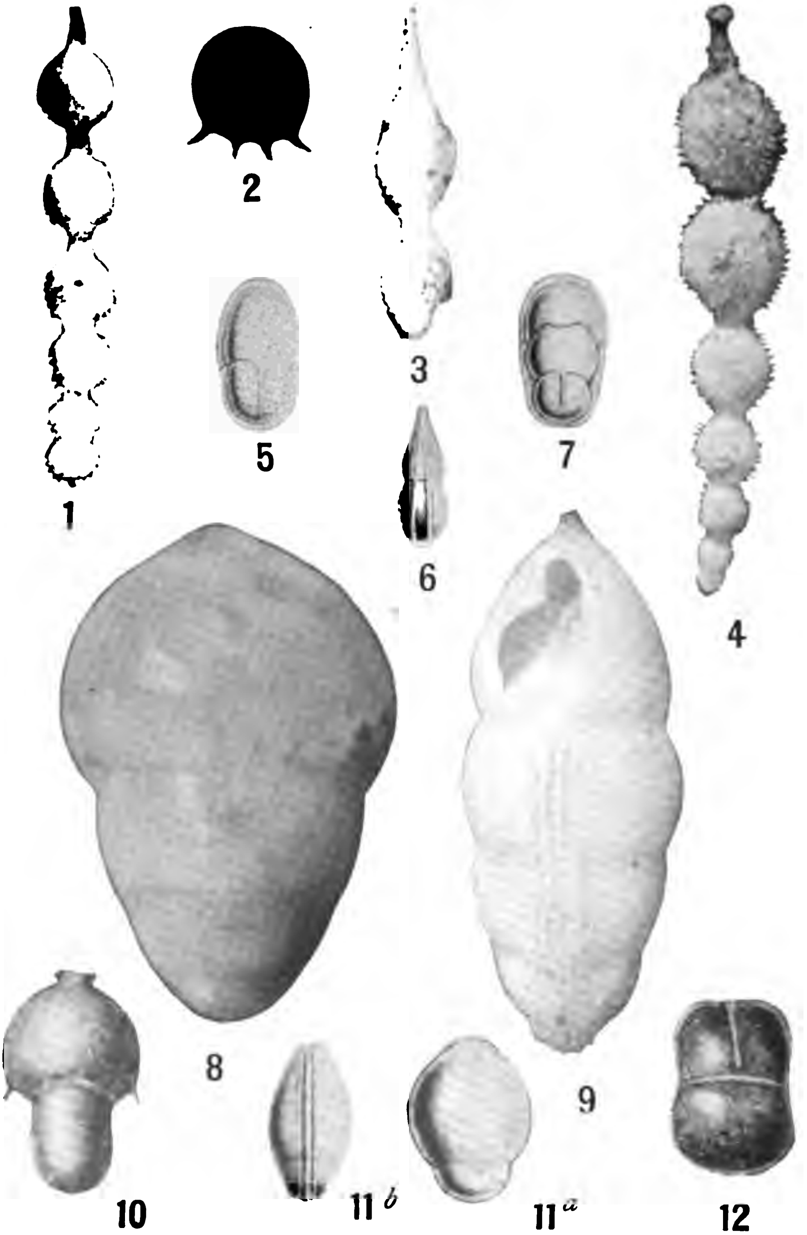


LAGENIDAE OF THE ATLANTIC OCEAN.

FOR EXPLANATION OF PLATE SEE PAGE 195.

PLATE 17.

FIG. 1. *Nodosaria sublineata.* ×25. Side view. D2150.

2. *Lingulina armata.* ×200. Front view. After Heron-Allen and Earland.
3. *Nodosaria intercellularis.* ×30. Side view of last-formed chamber. D2150.
4. *Nodosaria hirsuta*, var. *aculeata.* ×25. Side view. D2399.
5. *Lingulina bicarinata.* ×176. Side view of specimen with three chambers. After Heron-Allen and Earland.
6. *Lingulina bicarinata.* ×176. Edge view. After Heron-Allen and Earland.
7. *Lingulina bicarinata.* ×176. Side view of normal specimen. After Heron-Allen and Earland.
8. *Lingulina seminuda.* ×25. Front view. D2760.
9. *Lingulina seminuda.* ×30. Side view of another specimen. D2399.
10. *Lingulina pellucida.* ×120. Front view. After Heron-Allen and Earland.
11. *Lingulina seminuda.* ×176. *a*, front view; *b*, side view. After Heron-Allen and Earland.
12. *Lingulina quadrata.* ×200. Front view. After Heron-Allen and Earland.

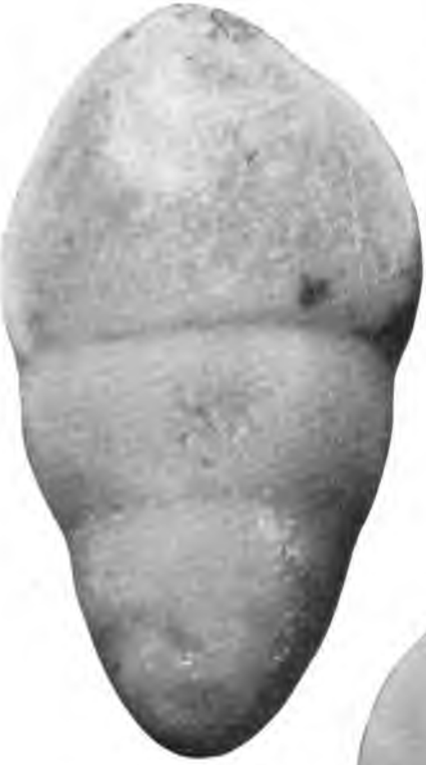
PLATE 18.

FIG. 1. *Lingulina seminuda.* ×25. Front view. D2751.

2. *Lingulina seminuda.* ×25. Front view. D2760.

3–5. *Lingulina biloculi.* ×200. Front views. After Heron-Allen and Earland.

6, 7. *Lingulina bicarinata.* ×200. Front views. Figure 6, by transmitted light. After Heron-Allen and Earland.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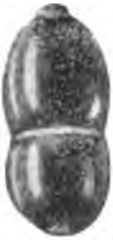
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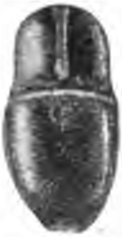
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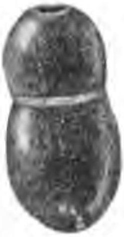
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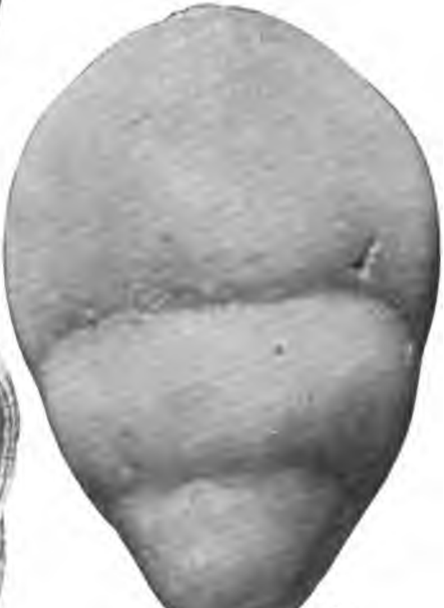
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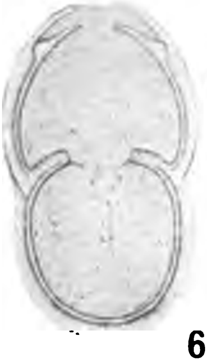
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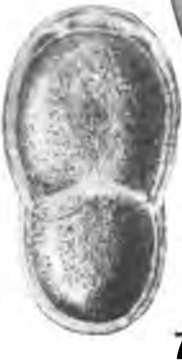
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Lagenidae of the Atlantic Ocean.

For explanation of plate see page 198.

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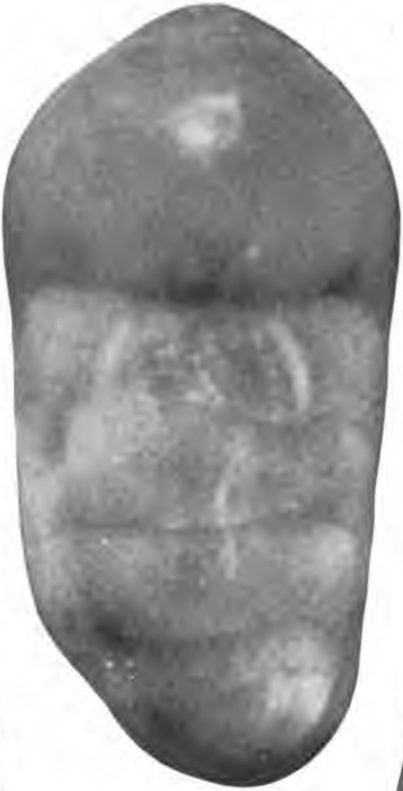

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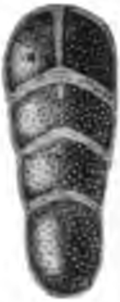

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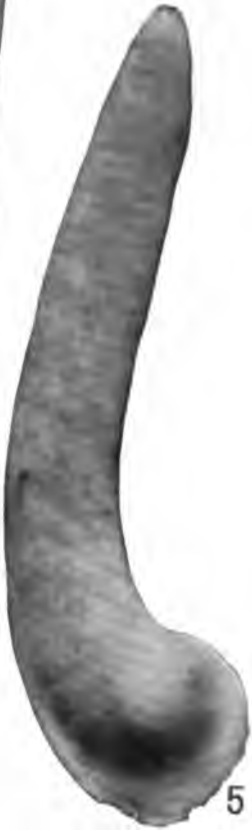

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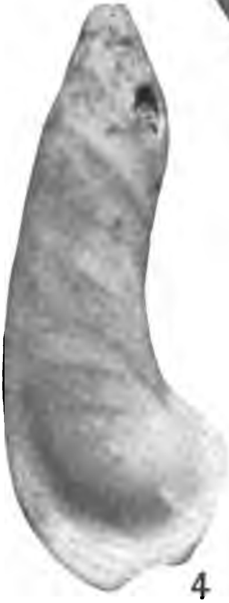

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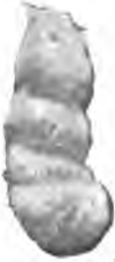

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LAGENIDAE OF THE ATLANTIC OCEAN.

FOR EXPLANATION OF PLATE SEE PAGE 197.

PLATE 19.

FIG. 1. *Lingulina carinata.* X25. Front view of microspheric specimen showing early coiling. From 40 fathoms off Ajax Reef, Florida.

2. *Lingulina carinata.* X200. Front view. After Heron-Allen and Earland.

3. *Cristellaria marginulinoides.* X30. Side view. D2313.

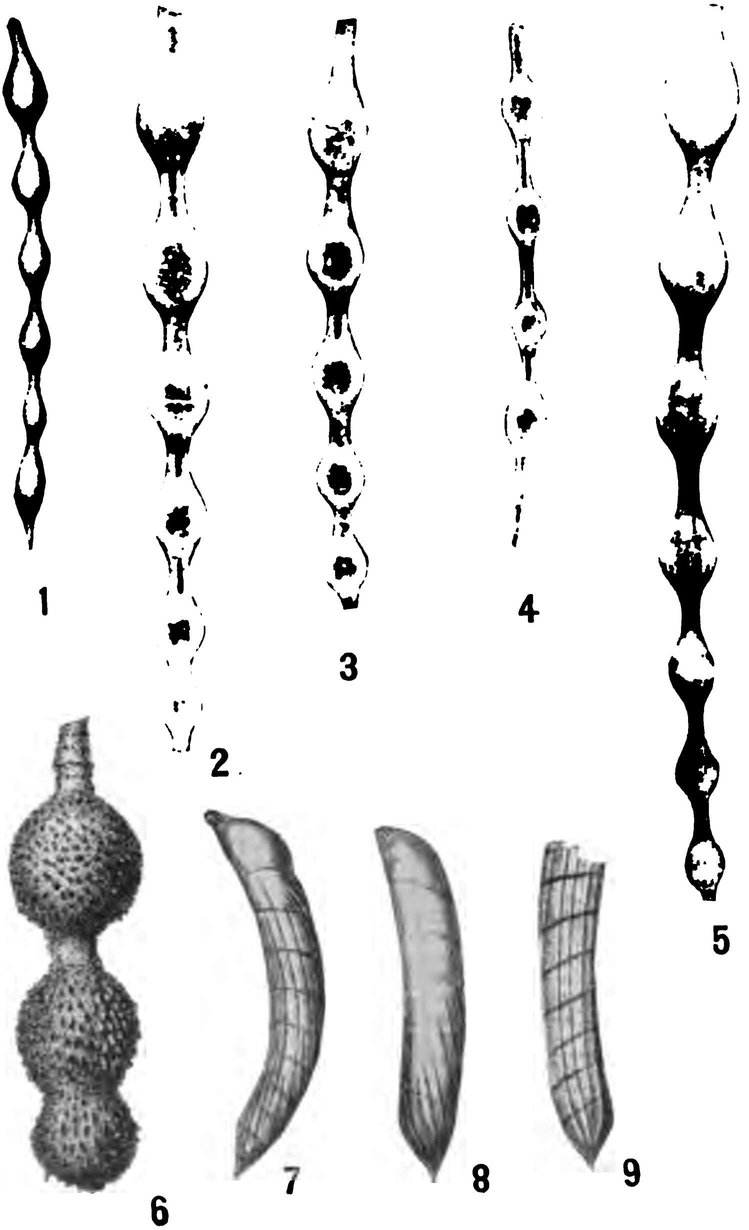
4, 5. *Cristellaria albatrossi.* X15. Side views. D2203.

PLATE 20.

FIGS. 1, 2. *Frondicularia advena.* ×30. Figure 1, front view of microspheric specimen; figure 2, front view of megalospheric specimen. D2205.

3. *Frondicularia*, species. ×30. Front view. D2192.

4. *Frondicularia sagittula*, var. *lanceolata.* ×25. Front view. D2399.



Lagenidae of the Atlantic Ocean.

For explanation of plate see page 194.

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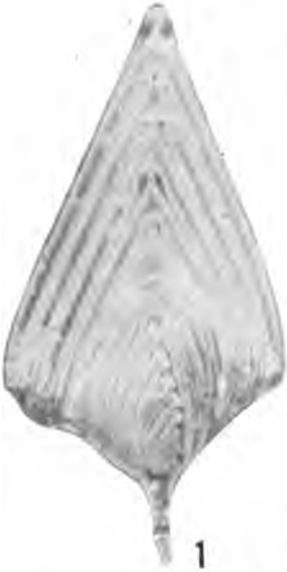
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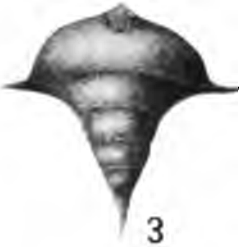
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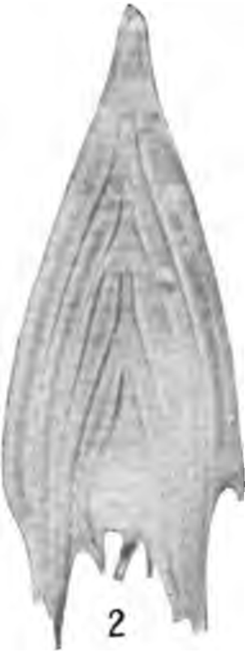
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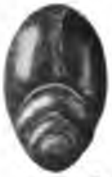
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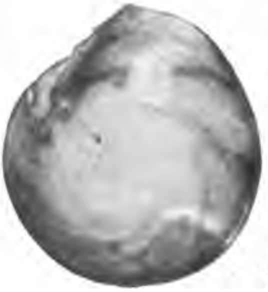
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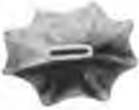
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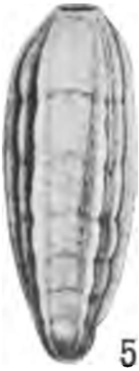
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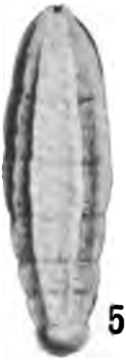
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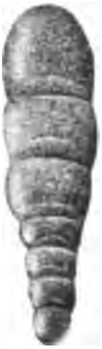
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LAGENIDAE OF THE ATLANTIC OCEAN.

FOR EXPLANATION OF PLATE SEE PAGE 199.

PLATE 21.

FIG. 1. *Frondicularia sagittula*, var. *lanceolata*. ×30. Front view of microspheric specimen. D2400.

2. *Frondicularia sagittula*. ×30. Front view of megalospheric specimen. D2377.

3. *Frondicularia pygmaea*. ×200. Front view. After Heron-Allen and Earland.

4. *Frondicularia translucens*. ×200. Front view. After Heron-Allen and Earland.

5. *Frondicularia tenera*. ×113. *a*, front view; *b*, side view; *c*, apertural view. After Heron-Allen and Earland.

6. *Frondicularia sidebottomi*. ×200. Front view. After Heron-Allen and Earland.

7. *Cristellaria orbicularis*. ×30. Side view. D2415.

PLATE 22.

FIG. 1. *Cristellaria d'orbignii.* ×25. Side view. D2682.

2. *Cristellaria rotulata.* ×25. Side view. D2377

3. *Trifarina bradyi.* *a*. side view; *b*. apertural view. After Balkwill and Wright.

4. *Trifarina bradyi.* ×75. *a*, side view; *b*. apertural view. After H. B. Brady.

5–7. *Trifarina bradyi.* ×50. Side views. D2677.

8. *Trifarina bradyi.* ×75. Side view. After H. B. Brady.

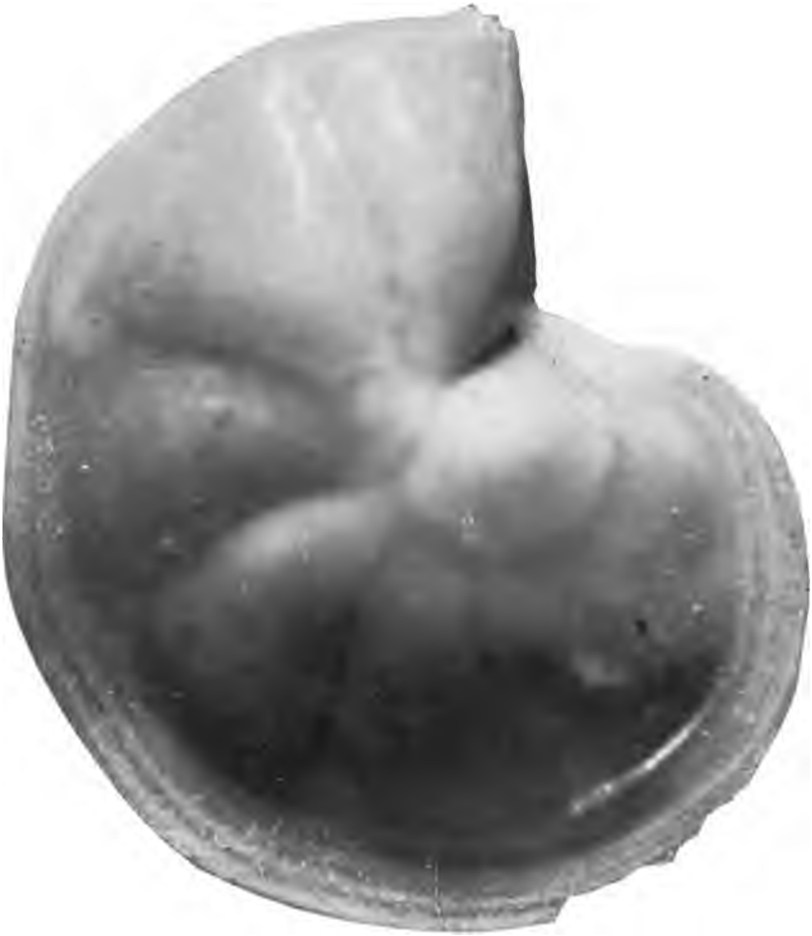
9. *Trifarina bradyi.* ×75. *a*. front view; *b*. apertural view. After H. B. Brady.

PLATE 23.

FIG. 1. *Cristellaria occidentalis*, var. *novangliae*. ×25. Side view of paratype. D2237.

PLATE 24.

FIG. 1. *Cristellaria occidentalis*, var. *novangliae*. ×25. Side view of holotype. D2237.



LAGENIDAE OF THE ATLANTIC OCEAN.

FOR EXPLANATION OF PLATE SEE PAGE 202.

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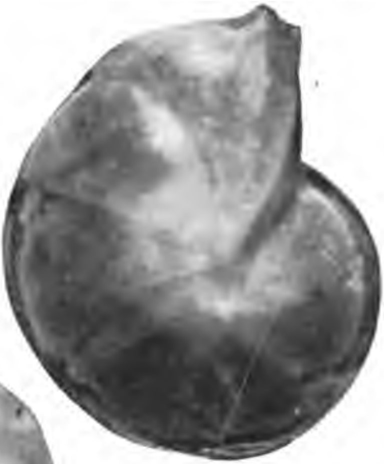

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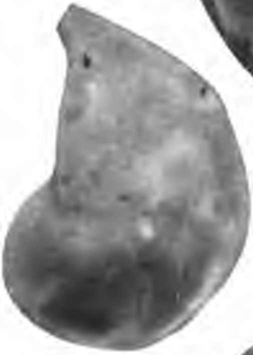

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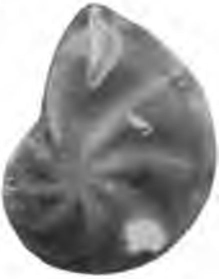

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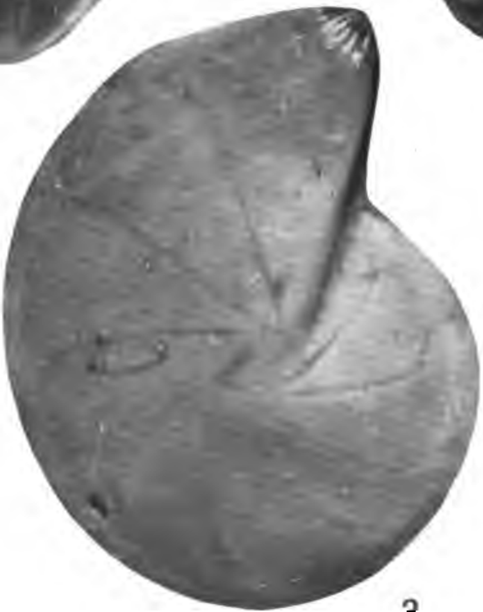

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LAGENIDAE OF THE ATLANTIC OCEAN.

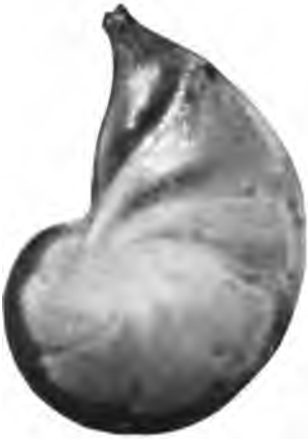
FOR EXPLANATION OF PLATE SEE PAGE 203.

PLATE 25.

FIG. 1. *Cristellaria occidentalis*, var. *torrida*. ×25. Side view. D2377.
2. *Cristellaria occidentalis*. ×25. Side view. D2041.
3. *Cristellaria occidentalis*, var. *glabrata*. ×25. Side view. D2541.
4. *Cristellaria gibba*. ×30. Side view. D2377.

PLATE 26.

FIGS. 1, 2. *Cristellaria occidentalis.* ×25. Side views. D2041.
3. *Cristellaria d'orbignii.* ×25. Side view. D2682.



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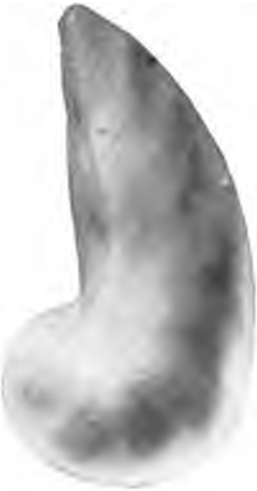

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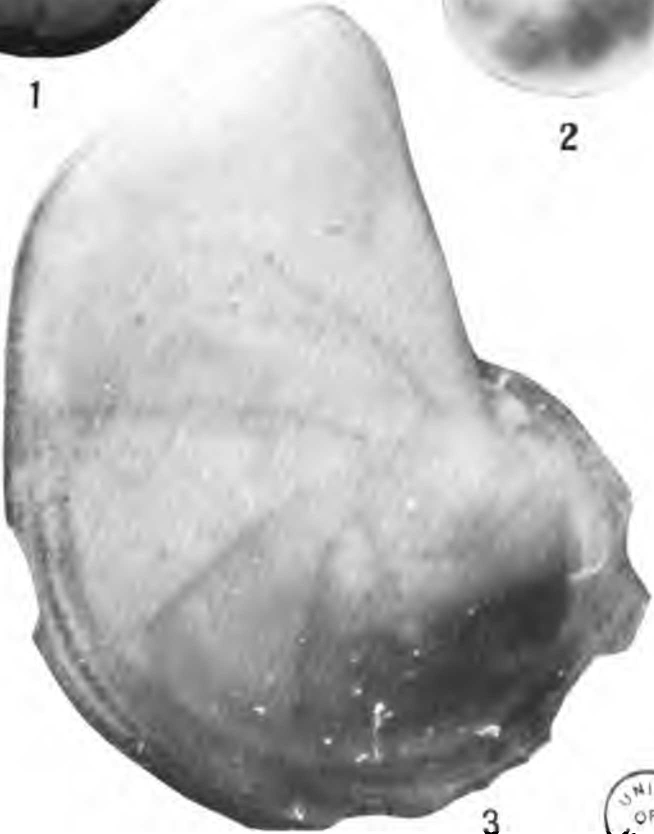

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LAGENIDAE OF THE ATLANTIC OCEAN.

FOR EXPLANATION OF PLATE SEE PAGE 204.

PLATE 26.

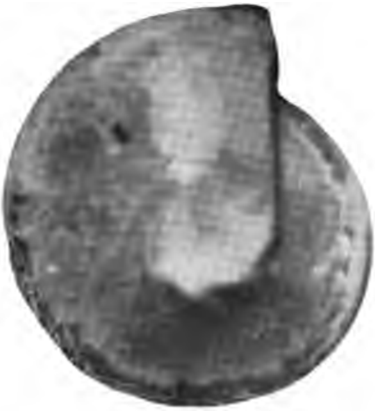
FIGS. 1, 2. *Cristellaria occidentalis.* ×25. Side views. D2041.
3. *Cristellaria d'orbignii.* ×25. Side view. D2682.

PLATE 27.

FIG. 1. *Cristellaria septentrionalis.* ×20. Side view. D2689.
2. *Cristellaria septentrionalis.* ×20. Side view. D2202.

PLATE 28.

FIG. 1. *Cristellaria rotulata.* ×20. Side view. D2399.
2. *Cristellaria rotulata.* ×25. Side view. D2644.
3. *Cristellaria submamilligera.* ×30. Side view. D2378.



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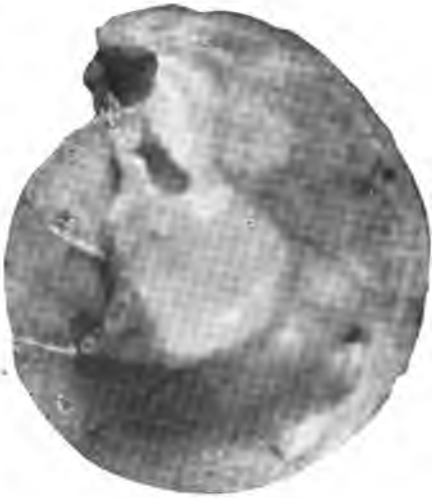

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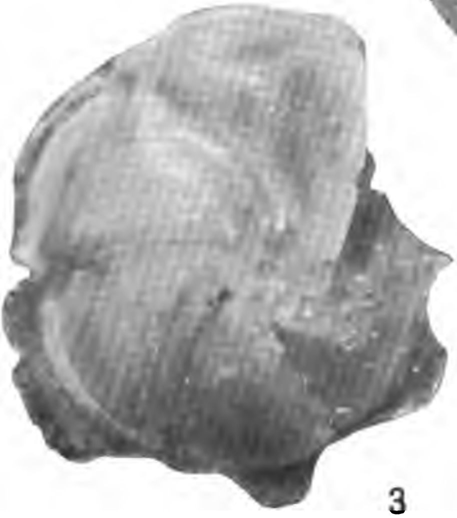

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LAGENIDAE OF THE ATLANTIC OCEAN.

FOR EXPLANATION OF PLATE SEE PAGE 206

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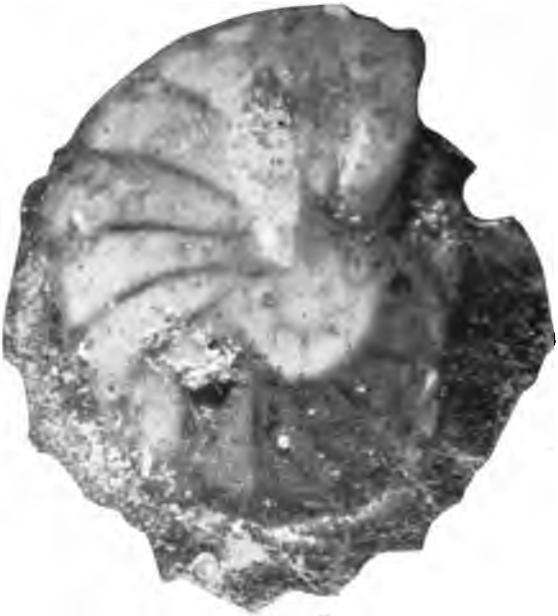

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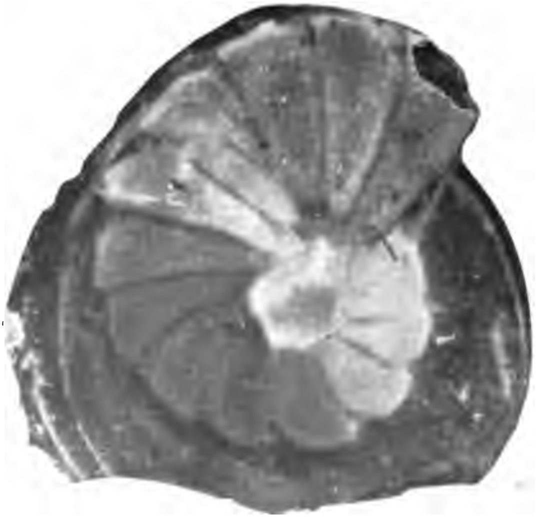


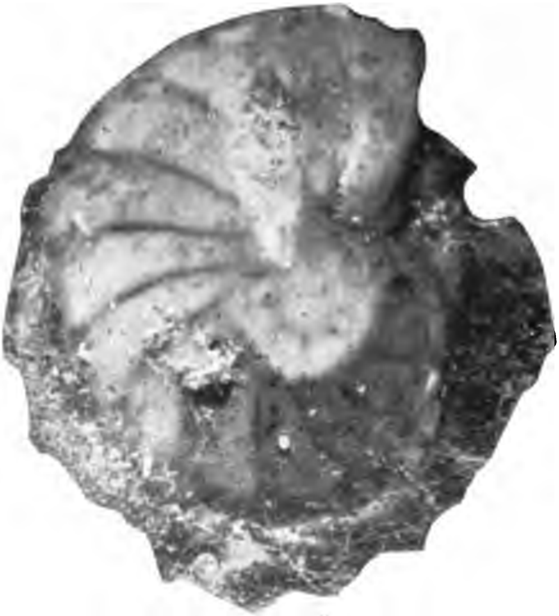
2

LAGENIDAE OF THE ATLANTIC OCEAN.

FOR EXPLANATION OF PLATE SEE PAGE 207.

PLATE 29.

FIG. 1. *Cristellaria formosa.* ×25. Side view. D2150.
2. *Cristellaria iota.* ×25. Side view. D2399.



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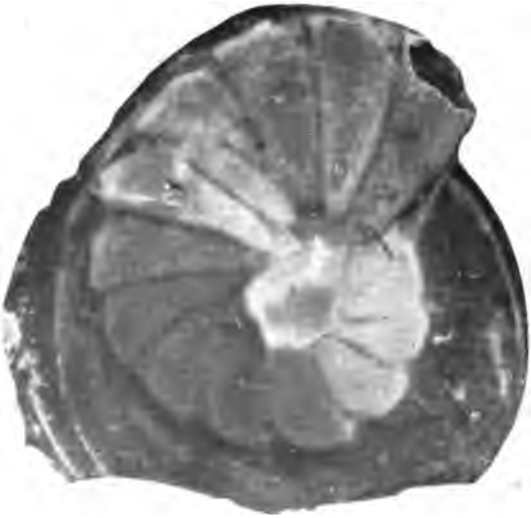

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LAGENIDAE OF THE ATLANTIC OCEAN.

FOR EXPLANATION OF PLATE SEE PAGE 207.

PLATE 29.

FIG. 1. *Cristellaria formosa.* ×25. Side view. D2150.
2. *Cristellaria iota.* ×25. Side view. D2399.

PLATE 30.

FIG. 1. *Cristellaria iota.* ×25. Side view. D2399.

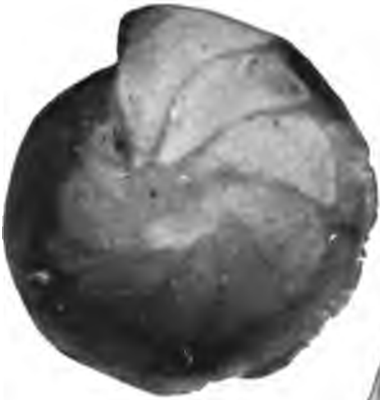
2. *Cristellaria lucida.* ×25. Side view. D2544.

3, 4. *Cristellaria peregrina.* ×30. Side views. Figure 3, young specimen; figure 4, adult specimen. D2202.

5. *Cristellaria obtusata*, var. *subalata.* ×25. Side view. H79.

6. *Cristellaria formosa.* ×25. Side view of young. D2377.

7. *Cristellaria calcar.* ×30. Side view. D2377.



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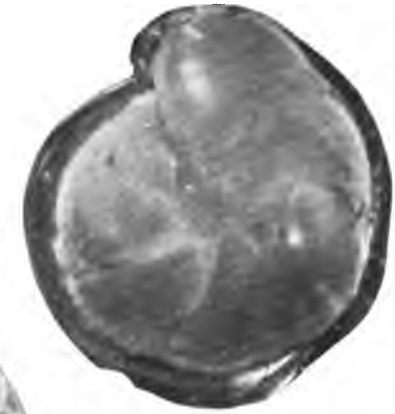

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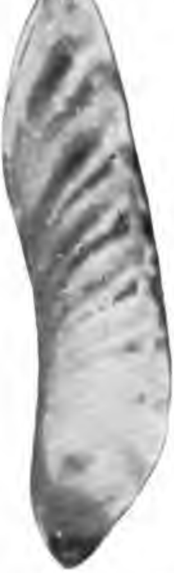

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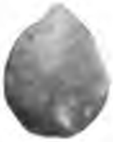

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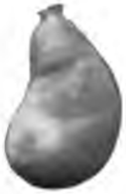

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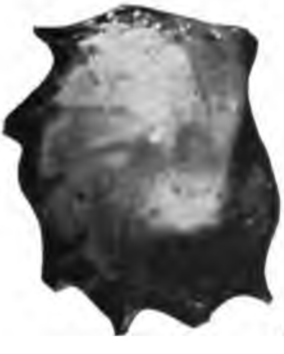

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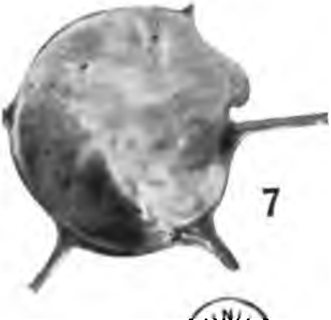

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LAGENIDAE OF THE ATLANTIC OCEAN.

FOR EXPLANATION OF PLATE SEE PAGE 208.

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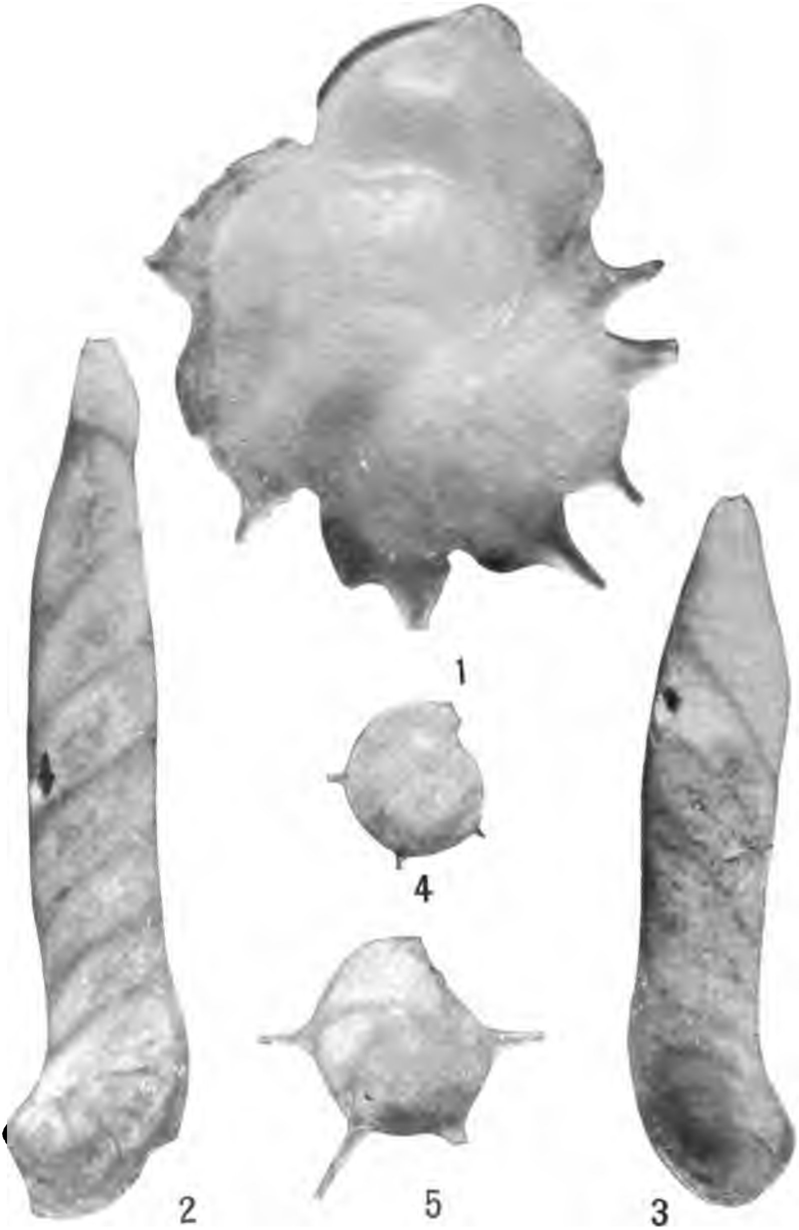


LAGENIDAE OF THE ATLANTIC OCEAN.

FOR EXPLANATION OF PLATE SEE PAGE 209

PLATE 31.

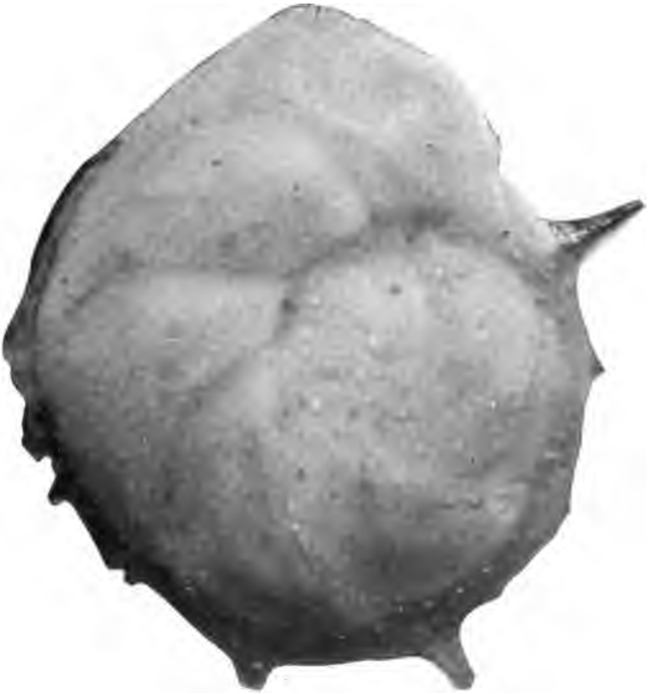
FIG. 1. *Cristellaria antillea.* ×25. Side view. D2377.

2, 3. *Cristellaria obtusata*, var. *subalata.* ×20. Side views. D2678.

4, 5. *Cristellaria calcar.* ×30. Side views. Figure 4, form with inflated test and very short spines. D2377.

PLATE 32.

FIG. 1. *Cristellaria antillea.* ×25. Side view. D2377.
2. *Cristellaria limbata.* ×25. Side view. D2399.
3. *Cristellaria limbata.* ×25. Side view of younger specimen. D2314.
4. *Cristellaria subaculeata*, var. *glabrata.* ×30. Side view. D2377.



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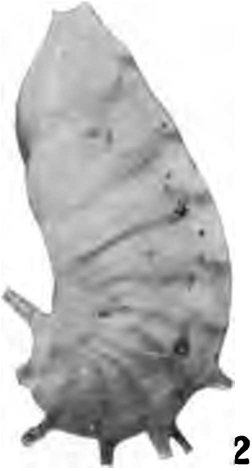

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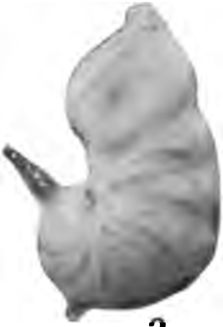

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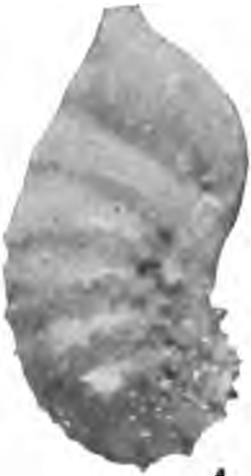

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LAGENIDAE OF THE ATLANTIC OCEAN.

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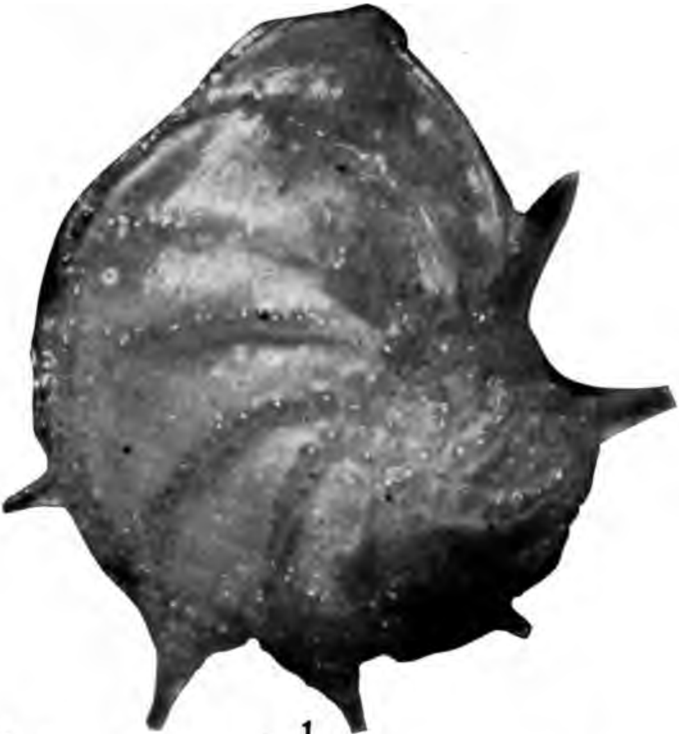

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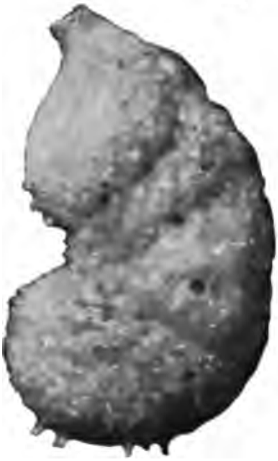

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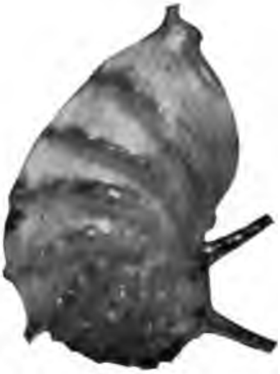

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LAGENIDAE OF THE ATLANTIC OCEAN.

FOR EXPLANATION OF PLATE SEE PAGE 211

PLATE 33.

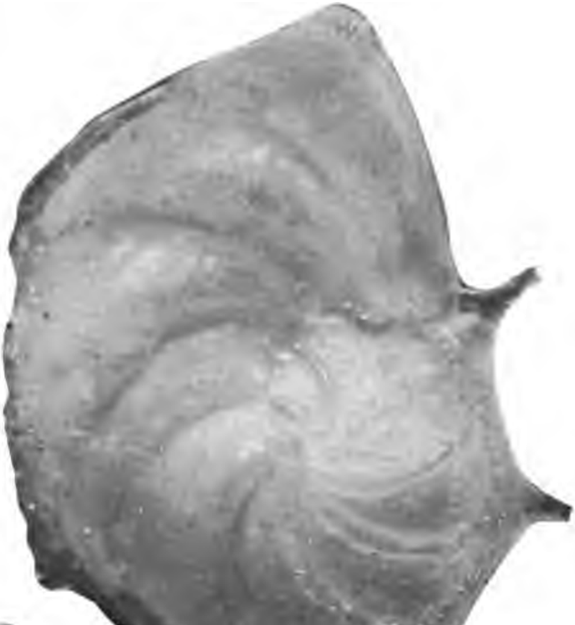
FIG. 1. *Cristellaria antillea.* ×25. Side view. D2377.

2. *Cristellaria subaculeata,* var. *glabrata.* ×30. Side view. D2399.

3. *Cristellaria subaculeata,* var. *glabrata.* ×30. Side view. D2377.

PLATE 34.

FIG. 1. *Cristellaria antillea*. ×25. Side view. D2377.
2. *Cristellaria subaculeata*. ×30. Side view. D2377.
3. *Cristellaria subaculeata*, var. *glabrata*. ×30. Side view. D2377.



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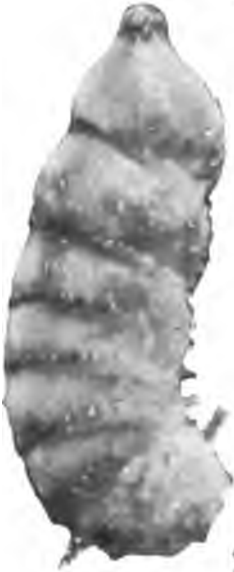

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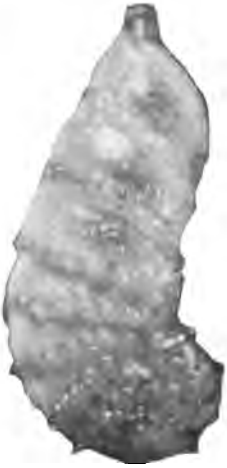

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LAGENIDAE OF THE ATLANTIC OCEAN.

FOR EXPLANATION OF PLATE SEE PAGE 212

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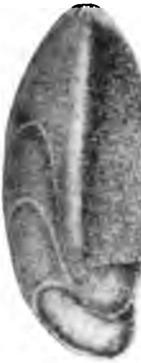
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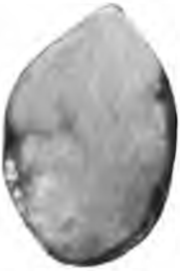
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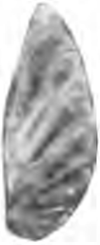
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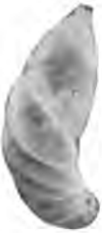
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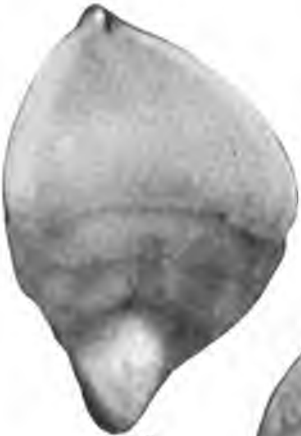
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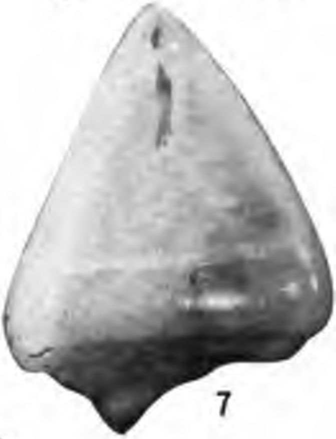
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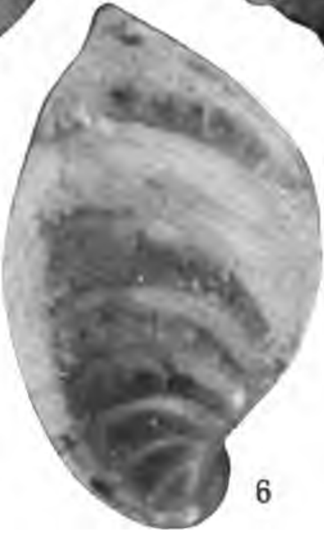
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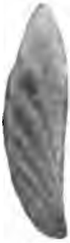
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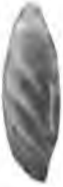
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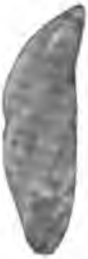
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LAGENIDAE OF THE ATLANTIC OCEAN.

FOR EXPLANATION OF PLATE SEE PAGE 213.

PLATE 35.

Fig. 1. *Cristellaria acutauricularis.* ×120. Side view. After Heron-Allen and Earland.

2. *Cristellaria italica.* ×30. Side view. D2399.

3. *Cristellaria crepidula.* ×30. Side view. D2756.

4. *Cristellaria crepidula.* ×30. Side view. D2648.

5–7. *Cristellaria italica.* ×30. Figure 5, front view; figure 6, side view; figure 7, apertural view. D2399.

8, 9. *Cristellaria schloenbachi.* ×30. Side views. D2150.

10. *Cristellaria schloenbachi.* ×30. Side view. D2400.

PLATE 36.

FIG. 1. *Cristellaria convergens.* ×13. Side view. After Heron-Allen and Earland.

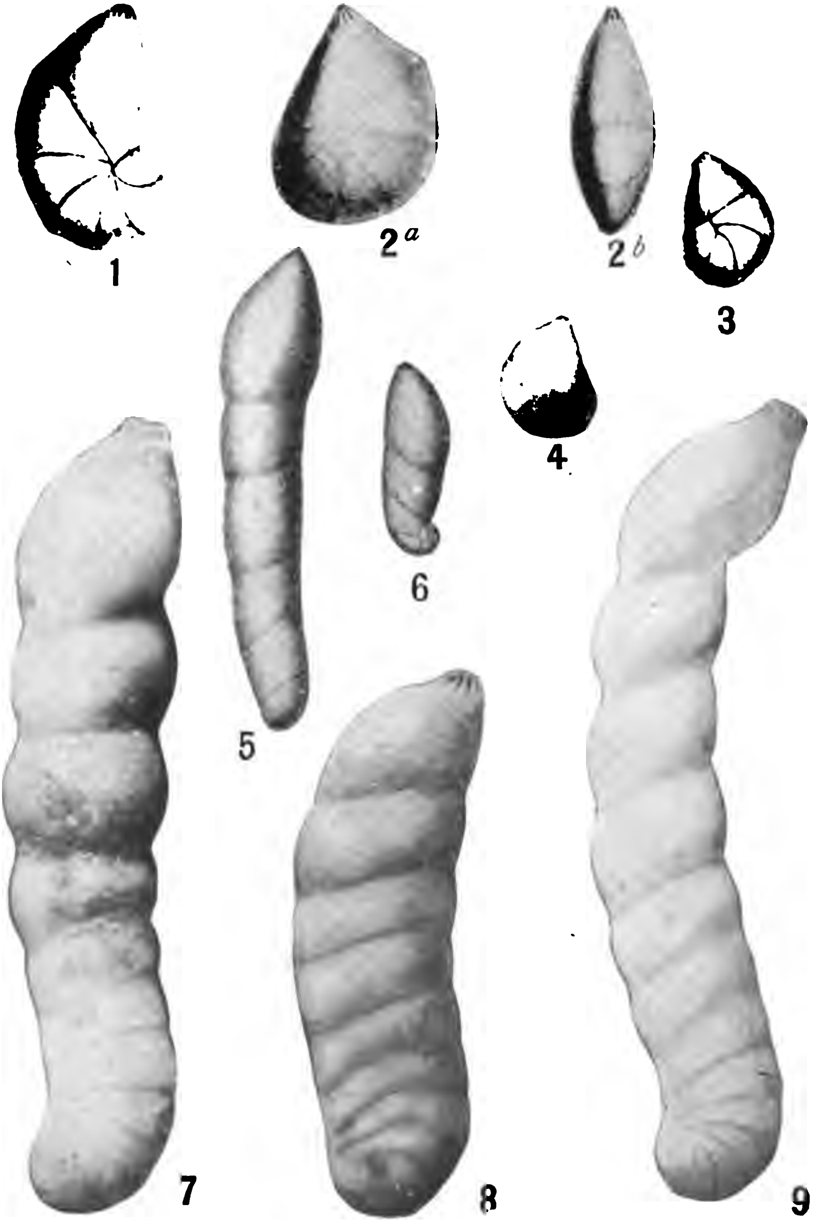
2. *Cristellaria convergens.* ×64. *a*, side view; *b*, front view. After Heron-Allen and Earland.

3. *Cristellaria convergens.* ×13. Side view. After Heron-Allen and Earland.

4. *Cristellaria convergens.* ×30. Side view. D2052.

5, 6. *Marginulina glabra.* ×25. Side views. After Balkwill and Wright.

7–9. *Marginulina bacheii.* ×25. Side views. D2425.



LAGENIDAE OF THE ATLANTIC OCEAN.

FOR EXPLANATION OF PLATE SEE PAGE 214.

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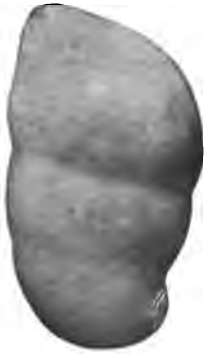

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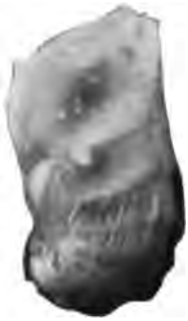

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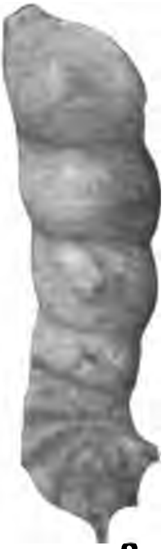

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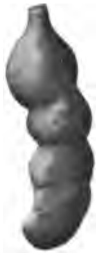

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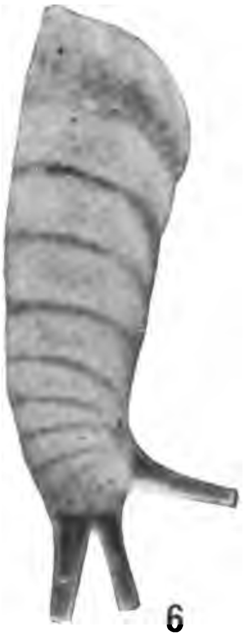

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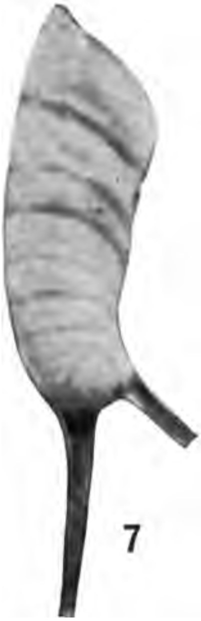

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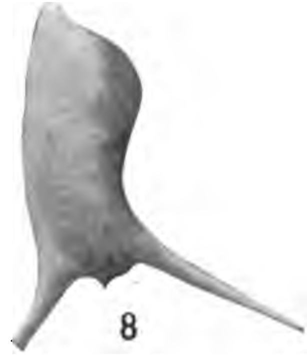

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LAGENIDAE OF THE ATLANTIC OCEAN.

FOR EXPLANATION OF PLATE SEE PAGE 215.

PLATE 37.

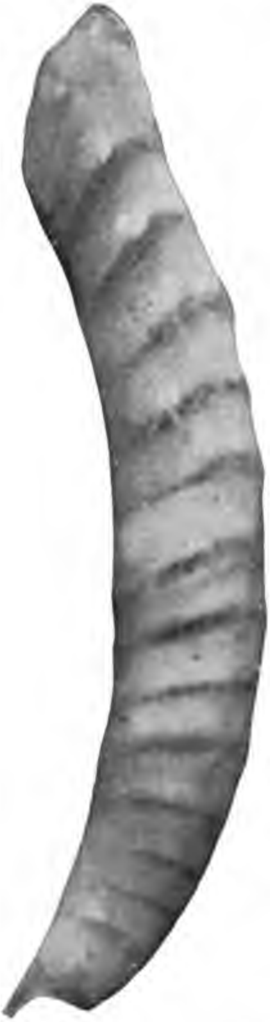
FIG. 1. *Marginulina glabra*, var. *obesa*. ×25. Side view. D2043.
2. *Marginulina costata*. ×25. Side view. D2399.
3. *Marginulina bacheii*, var. *ensiformis*. ×25. Side view. D2648.
4. *Marginulina striatula*. ×30. Side view. D2117.
5. *Vaginulina legumen*. ×25. Side view. D2112.
6, 7. *Vaginulina spinigera*. ×20. Side views. D2115.
8. *Vaginulina spinigera*. ×25. Side view of young specimen. D2203.

PLATE 38.

FIG. 1. *Vaginulina spinigera.* ×15. Side view of old-age specimen. D2352.

2. *Vaginulina bermudensis.* ×25. Side view of type specimen. Challenger Bank, off Bermuda.

3, 4. *Vaginulina americana.* ×20. Side views. D2415.



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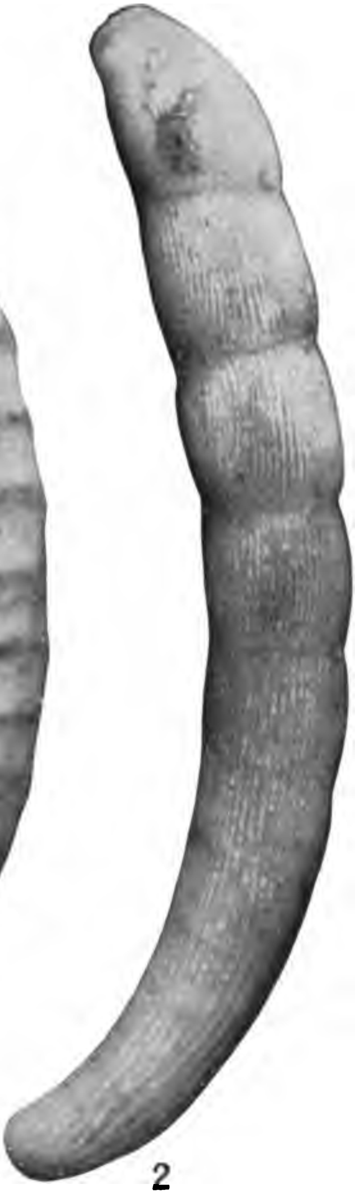

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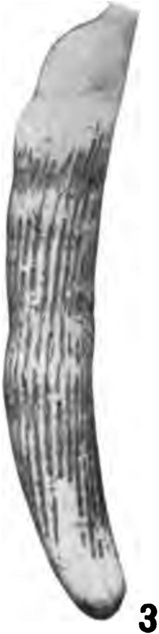

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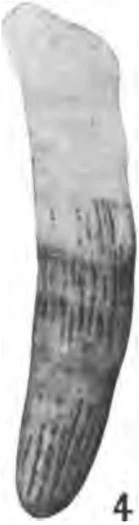

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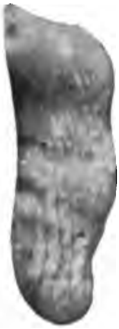
LAGENIDAE OF THE ATLANTIC OCEAN.

FOR EXPLANATION OF PLATE SEE PAGE 216.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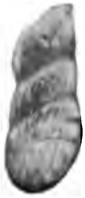
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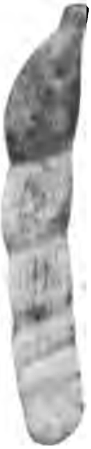
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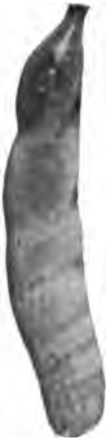
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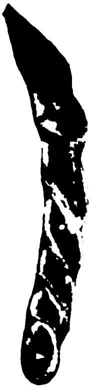
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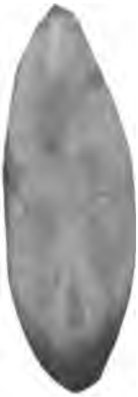
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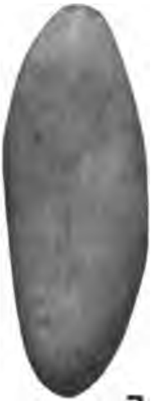
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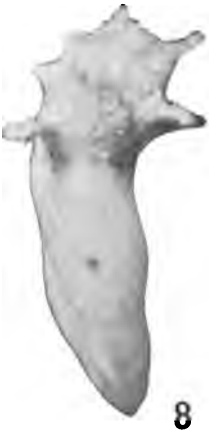
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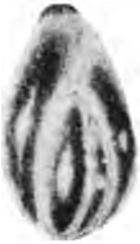
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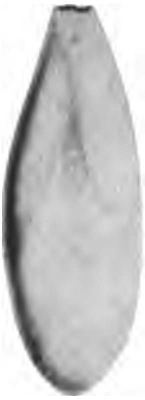
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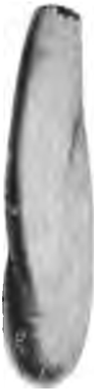
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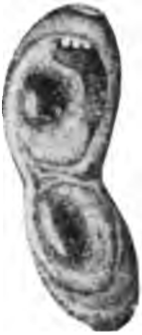
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LAGENIDAE OF THE ATLANTIC OCEAN.

FOR EXPLANATION OF PLATE SEE PAGE 217.

PLATE 39.

FIG. 1. *Vaginulina advena.* ×30. Side view. Off Sand Key, Florida.

2, 3. *Vaginulina advena.* ×25. Side views. D2641.

4. *Vaginulina advena.* ×25. Side view. Off Bell, Fowey, Florida.

5. *Vaginulina peregrina.* ×30. Side view. D2311.

6, 7. *Polymorphina lactea*, var. *novangliae.* ×25. Side views. Cobscook Bay, near Eastport, Maine.

8. *Polymorphina lactea*, var. *novangliae.* ×25. Side view of specimen with fistulose last-formed portion. D2097.

9. *Polymorphina lactea.* Side view of young specimen. After Williamson.

10. *Polymorphina cylindroides.* ×64. *a*, front view; *b*, side view. After Heron-Allen and Earland.

11. *Polymorphina lactea.* ×75. Side view of double specimen. After Heron-Allen and Earland.

PLATE 40.

FIG. 1. *Polymorphina communis.* ×40. Front view. D2112.

2. *Polymorphina communis.* ×40. Specimen attached to fragment of rock. D2639.

3. *Polymorphina equalis.* ×30. Front view of fistulose specimen. D2395.

4, 5. *Polymorphina lanceolata.* ×40. Side views. D2174.

6. *Polymorphina pulchella.* ×50. Front view. D2420.

7. *Polymorphina lactea,* var. *oblonga.* ×120. Side view. "depauperate." After Heron-Allen and Earland.

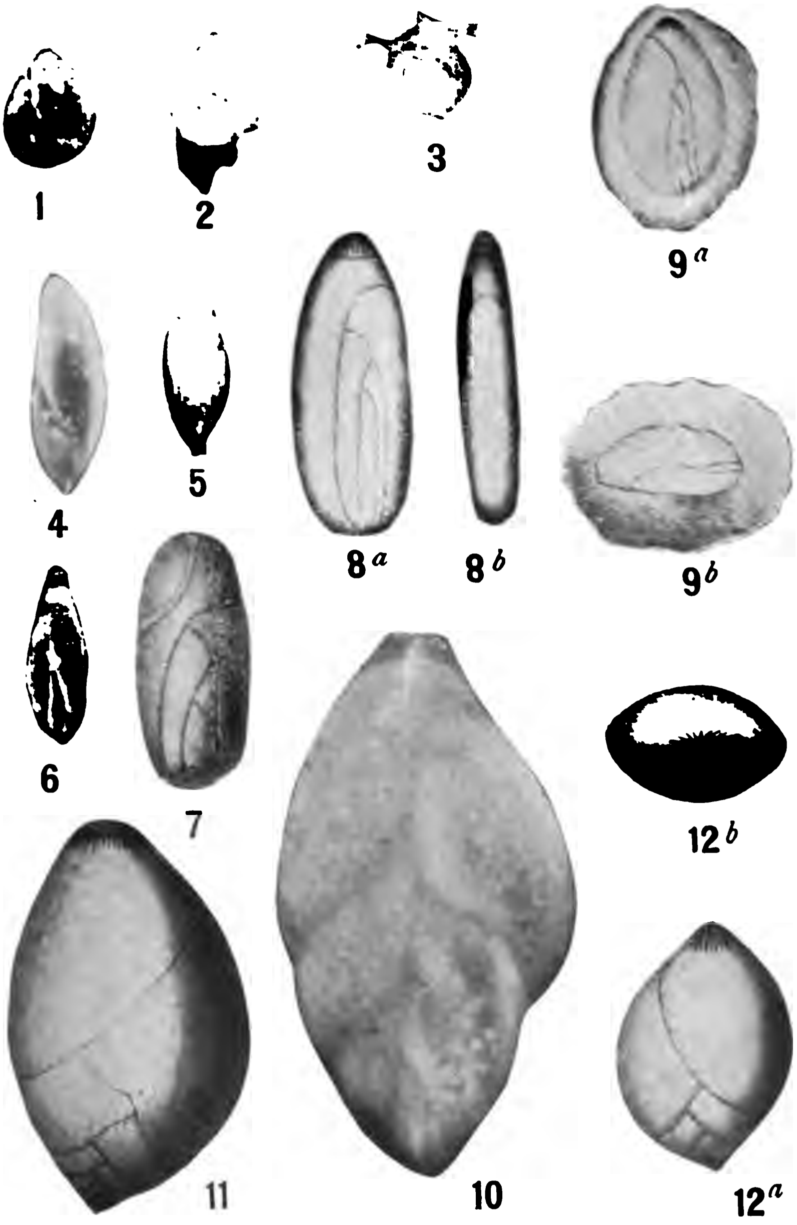
8. *Polymorphina lactea,* var. *oblonga.* *a,* front view; *b,* side view. After Williamson.

9. *Polymorphina concava.* Views of opposite sides. After Williamson.

10. *Polymorphina flintii.* ×25. Front view. D2415.

11. *Polymorphina ovata.* ×25. Front view. After H. B. Brady.

12. *Polymorphina ovata.* ×25. *a,* front view; *b,* apertural view. After H. B. Brady.



Lagenidae of the Atlantic Ocean.

For explanation of plate see page 218.

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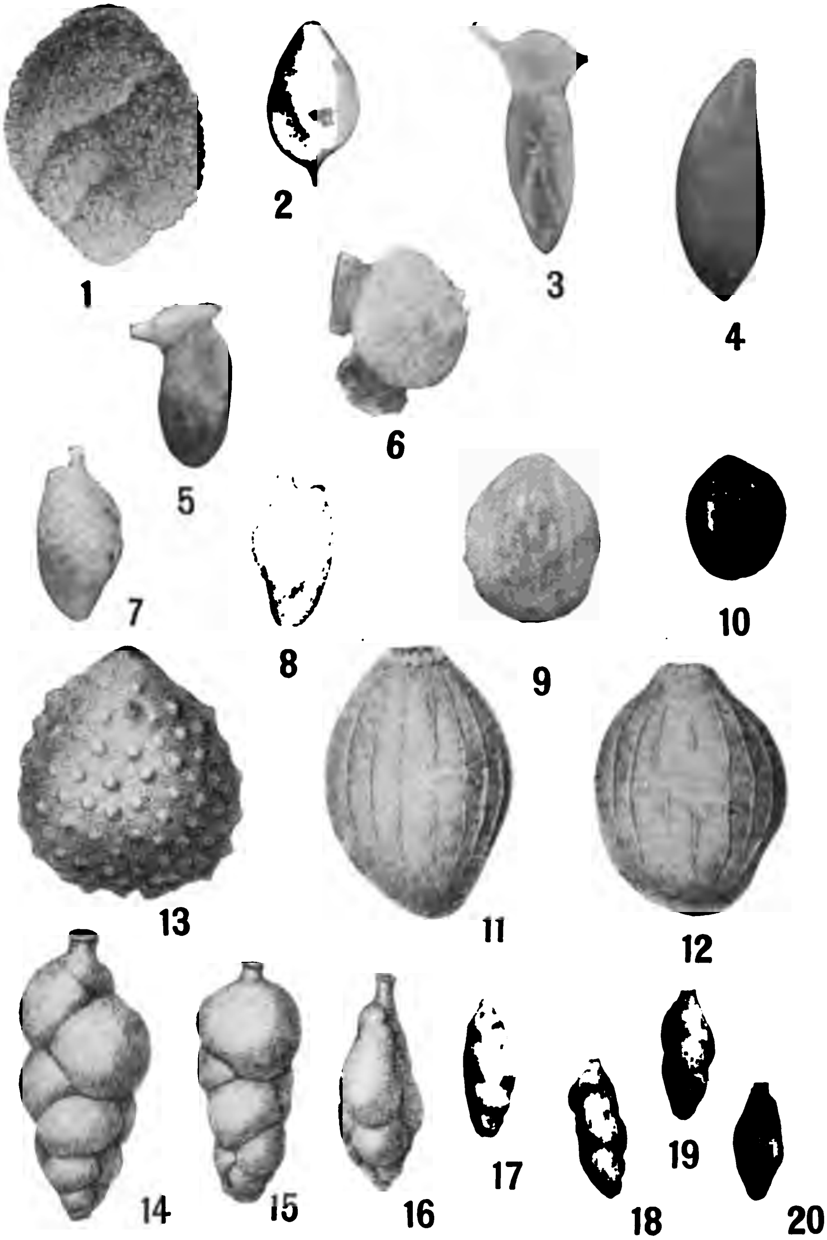


LAGENIDAE OF THE ATLANTIC OCEAN.

FOR EXPLANATION OF PLATE SEE PAGE 218.

PLATE 41.

Fig. 1. *Polymorphina spinosa.* ×100. Front view. After Heron-Allen and Earland.

2. *Polymorphina sororia,* var. *cuspidata.* ×40. Front view. D2150.

3. *Polymorphina sororia.* ×40. Fistulose form. D2713

4. *Polymorphina sororia.* ×35. Front view. D2038.

5. *Polymorphina sororia.* ×40. Fistulose form. D2038.

6. *Polymorphina rugosa.* ×40. Front view of specimen attached to small pebbles. D2112.

7. *Polymorphina extensa.* ×50. Side view. D2105.

8. *Polymorphina extensa.* ×50. Side view. D2035.

9, 10. *Polymorphina myristiformis.* ×50. Front views. Off Plymouth, England.

11, 12. *Polymorphina myristiformis.* ×50. After Heron-Allen and Earland.

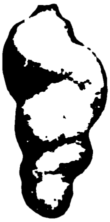
13. *Polymorphina spinosa.* ×100. Front view. After Balkwill and Wright.

14–16. *Uvigerina canariensis.* Figure 14, ×50; figure 15, ×60; figure 16, ×75. After H. B. Brady.

17–20. *Uvigerina angulosa.* ×30. D2078.

PLATE 42.

FIGS. 1, 2. *Uvigerina semicostata.* ×50. Side views. D2160.
3, 4. *Uvigerina auberiana.* ×40. Side views. D2754.
5. *Uvigerina ampullacea.* ×50. Side view. D2117.
6. *Uvigerina ampullacea.* ×40. Side view. H60.
7–9. *Uvigerina peregrina.* ×30. Front views. D2018.
10. *Uvigerina peregrina.* ×30. Front view. D2029
11. *Uvigerina peregrina,* var. *parvula.* ×30. Front view. D2400.
12. *Uvigerina peregrina,* var. *bradyana.* ×30. Front view. D2568.
13. *Uvigerina flintii.* ×30. Front view. D2641.
14. *Siphogenerina raphanus.* ×30. Front view. D2150.
15. *Siphogenerina advena.* ×50. Front view. D2150.
16. *Siphogenerina dimorpha.* ×113. *a*, side view; *b*, apertural view. After Heron-Allen and Earland.
17. *Siphogenerina dimorpha.* ×50. Front view of microspheric specimen. D2150.
18. *Siphogenerina dimorpha.* ×50. Front view of megalospheric specimen. D2614.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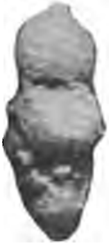
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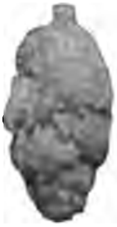
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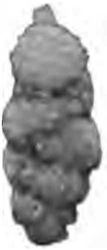
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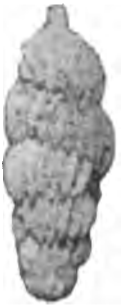
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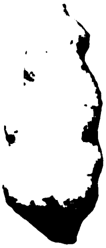
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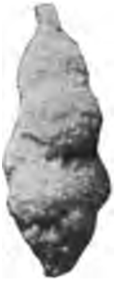
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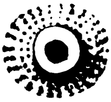
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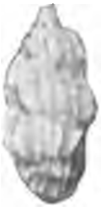
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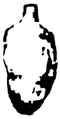
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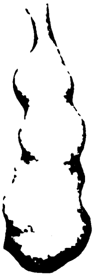
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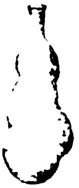
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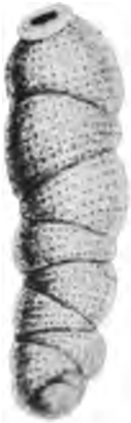
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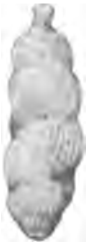
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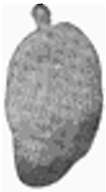
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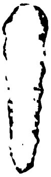
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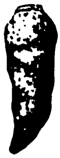
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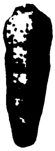
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